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Antic™

The ATARI® Resource

AUGUST 1983 VOLUME 2, NUMBER 5

- GRAPHICS
- Atari Signs Alan Alda
- 3-D Fuji
- Datasoft's Pat Ketcham
- Escher Sketcher
- 'Maze Maniac' Game



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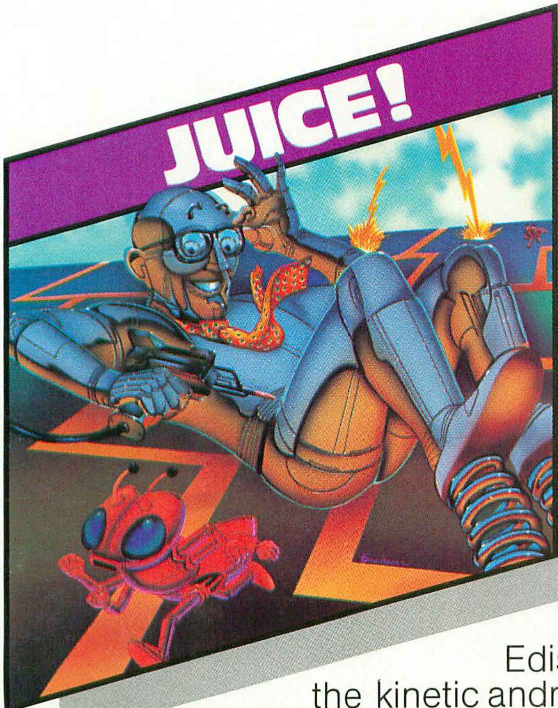
That's right. And that's not all.

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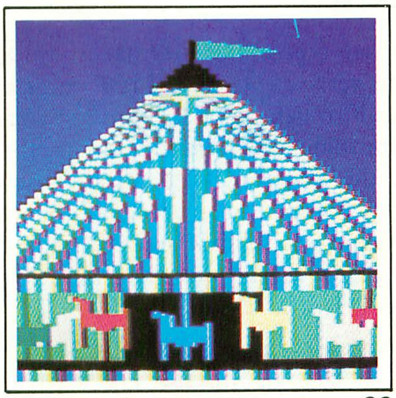
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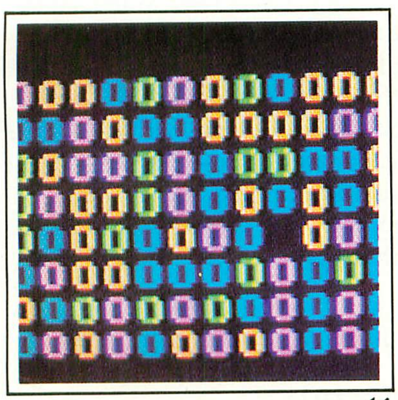
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I/O BOARD

CORRECTION

We have just read the review of our MMG data base system in ANTIC (June, 1983), and found a number of factual errors:

1. The record size is 500, not 270.
2. Field size is 50, not 27.
3. We *do* have an excess field warning; you stated we did not.
4. Our review mode shows 10 fields on the screen, not three as you indicated.
5. We *do* have an auto page number; you indicated we did not.
6. You *may* use the reverse side of our disks. You indicated that our protection scheme prohibited that.
7. We were never contacted by anyone at ANTIC or by Ken Harms concerning our data base.

The name of our program is "MMG Data Manager", not "MMG File Manager" and we have enclosed a copy, so you can see for yourself the above points are valid. We respect the opinion of Mr. Harms, but frankly don't understand how he reviewed the program and missed so many critical points of fact.

Greg Pfremmer
Vice President
MMG Micro Software

One big problem: we reviewed an older version of the product than the one now sold. New version supplied by MMG does allow 500-character records and 50-character fields. "Field-length warning," however, is just a dot (period) at end of line, and can be overrun with no further notice. All ten fields are now visible during "edit" mode, but now only one search criterion is supported. I assume auto-page numbering works, though I was unable to test it.

The reason the protection scheme prevents saves on the reverse of the disk is that you can't copy their master disk. You could save to reverse of the master if you were willing to punch the hole in the jacket (risking damage to the master), but I'm not. I did goof up the name — sorry about that.

MMG will ship a free copy of the new version to anyone who sends them the old one — a commendable policy.
—Ken Harms

WORTH IT

Your new typesetting does make the programs very easy to read. However, it is difficult to determine the correct spacing for some Print commands. I usually type the program, RUN it, and then modify the spacing as needed. This is a little extra effort. But I have become used to the new format now, and the extra effort is worth it.

Ray Floyd
Caruthers, CA

PERFECT ENOUGH

I must take exception to your criticism of the Data Perfect User Manual (Data Base Survey, June 1983). If the beginning user follows the well-written tutorial in the front of the manual, he/she will quickly become familiar with Data Perfect's major features. The rest of the manual is organized for occasional reference only, and is more than adequate for that purpose.

Ed Garrigan
Fairfax Station, VA

VIDEO OUT

Your ultrasound article (ANTIC #6) says that ATARI 400 owners can't make use of the cable without internal modifications. The problem seems to be the absence of a monitor output. Many of us would like to know how to adapt our 400 to drive a monitor.

Steve Miller
Banning, CA

You may already know about the XTRAVIDEO 1, a monitor output adapter for the 400. It is available from HARDSEL, PO Box 565, Metuchen, NJ 08840. —ANTIC ED

continued on page 8

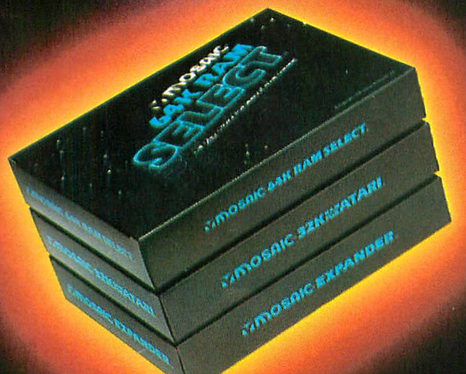
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I/O BOARD

DRIVE QUESTIONS

I have some questions about my 810 Disk Drive:

1. I've gotten into the habit of removing a disk as soon as the cursor returns to the screen, even though the busy light is still on. Is this OK?

2. Why does the Disk Drive keep spinning for a few seconds after the I/O operation is finished, while other computers shut off the drive immediately?

3. How do I adjust disk speed? Also, if it can be adjusted, why not set it to top speed, for faster I/O?

4. Does a micro-buffer exist for my drive?

Scott Lush
Jackson Heights, NY

1. We find that it saves a significant amount of waiting time to remove a disk before the busy light goes out, and doesn't seem to harm the disk. First make sure that the I/O operation has been completed by listening to the monitor or TV speaker for the cessation of beeps (read) or clunks (write).

2. Atari built this feature into the Operating System to save time in case of sequential read operations. If several reads are made over the course of a few seconds, as is often the case with disk-based applications, the drive motor doesn't have to restart for every read, saving a significant amount of time.

3. We do not recommend that you adjust your drive's speed. Take it to an authorized repairman if a speed test indicates a significant difference from the factory-adjusted speed of 288 RPM. If the drive runs much faster or slower than this, you will probably have problems with disk access.

4. If, by a micro-buffer, you mean a device for your disk drive similar to those which are positioned between computer and printer to temporarily store text to be printed, the answer is no. The Happy 810 Enhancement adds a one-track (18 sectors) buffer which considerably reduces seek time, thus speeding up the disk read rate. —ANTIC ED

IMPATIENT FIREMEN

I'm writing a football drafting program that lists current NFL players for a paper football league that I run. As an example, consider a list of quarterbacks generated from the program's data. An owner in the league would look over the list, pick a player, and type in the player's name after an INPUT prompt. Now I want to erase that player's name from the screen and simultaneously add it to the drafting owner's roster.

Your suggestions are eagerly awaited by half of the San Francisco Fire Dept.

Arthur Cofresi
Vacaville, CA

It's hard to answer because you don't say how you are manipulating data. Simulated string arrays might work, and have been discussed many places. Another solution might use ATARI's unique "forced-read" mode to print DATA statements containing the necessary information to the screen and then enter the statements into the program. Space prevents us from describing this in full, but essentially you print the information on one line, or several, "CONT" on the next, POKE 842,12, POSITION the cursor at the first line to be entered, STOP the program, and POKE 842,13 as the very next statement after "STOP" in the program. This method is discussed in Educational Software's Tricky Tutorial #1. —ANTIC ED

FRUSTRATION

Nothing is more frustrating than typing in a program only to have it crash when it is run. A month or two later you find the corrections hidden away in the back of the magazine. I suggest any listings should have a disk or tape submitted with the article. Someone from your staff can run the program and make sure that it is correct.

Gary D. Parker
Rancho Cordova, CA

Programs published in ANTIC are usually submitted on disk or tape, and we always make sure the program runs, though we can't test each thoroughly. When we decide to publish a program, we generate a listing from the tested version on the printer in the ANTIC office. Then we transmit the same file to the typesetter electronically. When we receive the typeset listing, we compare it with our printout. Sometimes we even type the program in again. As a result, most of our listings have been error-free. Mistakes have been made and will be made, but we try our best to assure that our programs run as published. —ANTIC ED

MAILING BUSINESS

My husband and I have just bought an ATARI 800 and a 410 cassette recorder. We would be interested in finding out about a mailing list business. Could such a business run efficiently on a home computer? Would there be enough clients to have a nice small-sized business? What type of printer should we use, and how many disk drives? What kind of software should we look for? We have tried to find this information everywhere; libraries and bookstores have been of no help. Do you have any suggestions.

Janet Matthews
Orlando, FL

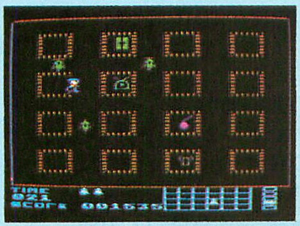
The ATARI 800 is capable of supporting a small mailing list business, but you will surely need a minimum of two disk drives for efficient work. Good, well-tested software is a must. Shop carefully for programs that produce results that you can sell, and make certain the programs work in your situation. You will probably want a good-quality, high-speed printer with a buffer memory, since your printer will determine the appearance of your product and the speed at which you can produce it. —ANTIC ED

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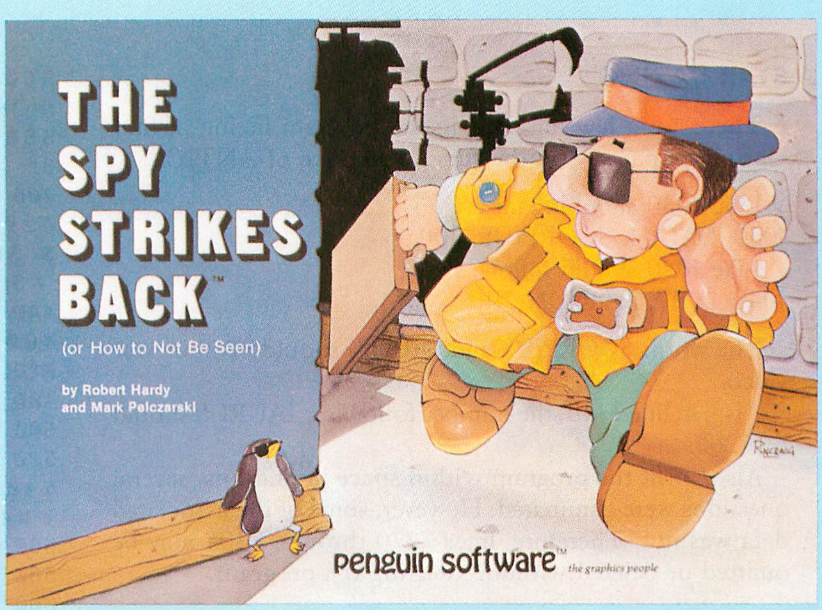
by Robert Hardy
and Mark Pelczarski



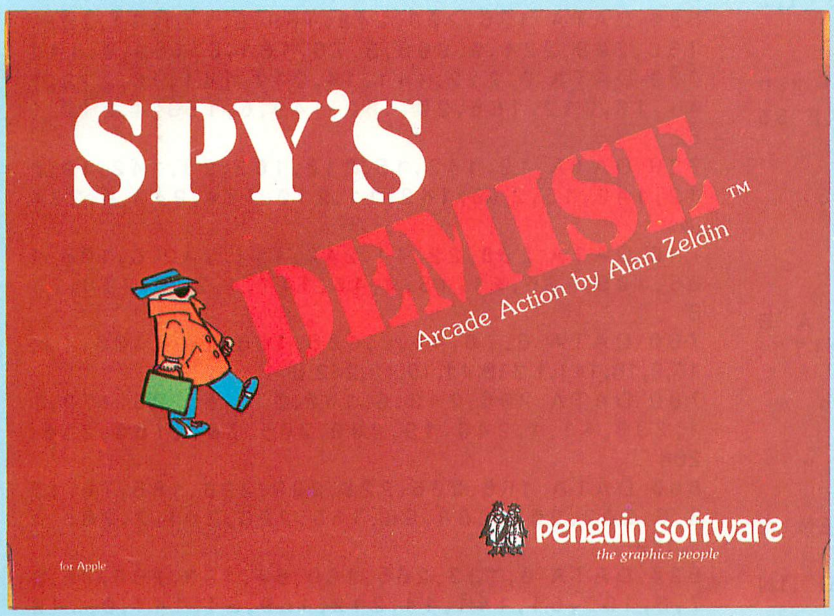
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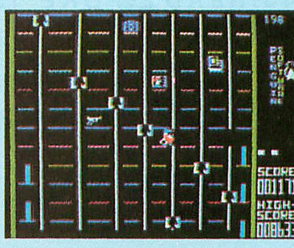
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STAR GAZING

There are a few mistakes in the program listing of Star Gazing on page 74 in the June 1983 issue of ANTIC.

Line 1030 should read:
1030 DATA 1. SCORPIUS,7100
Line 1040 should follow:
1040 DATA 2.ORION,7110

The words SCORPIUS and ORION should be in inverse video.

Also, in line 1440, the number following TAURUS should be 7260.

Also, to fit the program within space limitations, several questions were eliminated. However, some of the associated data was not. Therefore, lines 7270 through 7305 may be omitted or deleted without affecting the program.

TALK IS CHEAP

The following listings were inadvertantly omitted from the article Talk Is Cheap, that appeared in ANTIC, July 1983 (p. 64):

```
20 FOR I=0 TO 243:READ Z:POKE 1536+I,Z
:NEXT I
40 GOTO 140
60 FOR I=16384 TO 32767:Z(PEEK(I))=Z(P
EEK(I))+1:NEXT I:POKE 54272,34:POKE 55
9,34
80 ? #3;CHR$(27);CHR$(56);CHR$(29);
100 FOR I=0 TO 255:? #3;I; " - " ; Z ( I ) ; "
 ";
120 NEXT I:CLOSE #3:GOTO 160
140 DIM Z(255),FN$(13)
160 GRAPHICS 0:? "OPTION--> 1 TALK A B
IT":? "          2 PLAY BACK THE BIT":
? "          3 TALK A LOT"
180 ? "          4 PRINT SUMMARY":? "
          5 PRINT THE NUMBERS"
200 ? "          6 SAVE A TALK":? "
          7 RESTORE A TALK"
220 TRAP 220:INPUT ANS:IF ANS>7 THEN 2
20
240 TRAP 240:? "WHAT SAMPLE SPEED":IN
PUT SS:IF SS>255 THEN 240
260 ON ANS GOTO 280,360,460,340,420,50
0,580
280 POKE 208,1:POKE 205,0:POKE 206,64:
POKE 207,SS:POKE 209,128
300 A=USR(1536):POKE 562,3:POKE 53775,
3
320 GOTO 160
340 FOR I=0 TO 255:Z(I)=0:NEXT I:POKE
54272,0:OPEN #3,8,0,"P:":POKE 559,0:GO
TO 60
360 POKE 207,SS:POKE 203,0:POKE 204,64
:POKE 208,0:POKE 206,128
380 A=USR(1536):POKE 562,3:POKE 53775,
3
400 GOTO 160
420 OPEN #3,8,0,"P:":? #3;CHR$(27);CHR
$(56);CHR$(29);:FOR I=16384 TO 32767:?
 #3;PEEK(I);" ";:NEXT I
440 CLOSE #3:GOTO 160
460 POKE 208,2:POKE 205,0:POKE 206,64:
POKE 207,SS:POKE 209,128
480 A=USR(1536):GOTO 460
500 ? "GIVE FILE NAME";:INPUT FN$
520 TRAP 500:OPEN #4,8,0,FN$:TRAP 560
540 POKE 559,0:FOR I=16384 TO 32767:PU
T #4,PEEK(I):NEXT I
560 CLOSE #4:POKE 559,34:GOTO 160
580 ? "GIVE FILE NAME";:INPUT FN$
600 TRAP 580:OPEN #4,4,0,FN$:TRAP 640
620 POKE 559,0:FOR I=16384 TO 32767:GE
T #4,Z:POKE I,Z:NEXT I
640 CLOSE #4:POKE 559,34:GOTO 160
660 DATA 104,169,8,141,31,208,173,31,2
08,41,1,208,249,160,255,162,255,32,149
,6
680 DATA 136,208,248,169,8,141,31,208,
166,208,224,0,208,3,76,181,6,169,0,141
700 DATA 0,212,141,14,212,141,10,212,1
41,10,212,166,207,32,149,6,173,4,210,1
62
720 DATA 19,142,15,210,162,23,142,10,2
12,142,15,210,142,11,210,174,243,6,224
,0
740 DATA 208,22,41,240,141,242,6,106,1
06,106,106,41,15,9,16,141,1,210,238,24
3
760 DATA 6,76,45,6,106,106,106,106,41,
15,9,16,141,1,210,41,15,13,242,6
780 DATA 206,243,6,160,0,145,205,173,3
1,208,41,1,240,19,230,205,208,163,230,
206
800 DATA 166,206,228,209,208,155,76,15
3,6,202,208,253,96,165,208,201,2,208,1
1,169
820 DATA 0,133,205,169,64,133,206,76,3
7,6,169,64,141,14,212,169,34,141,0,212
840 DATA 96,169,0,141,14,212,141,0,212
,166,207,32,149,6,160,0,177,203,170,10
6
860 DATA 106,106,106,41,15,9,16,141,1,
210,138,41,15,9,16,24,24,24,24,166
880 DATA 207,32,149,6,141,1,210,230,20
3,208,206,230,204,166,204,228,206,208,
206,76
900 DATA 153,6,0,0
```

continued on page 96

PAT KETCHUM

Riverboat gambler at DataSoft

by TAY VAUGHAN

In less than three years of hard work, 29-year-old Pat Ketchum and his team of creative programmers and marketing wizards have built DataSoft into one of the most successful software companies in the home computer industry. ANTIC *wanted to find out how they did it and what kind of people they are.*

I visited the DataSoft headquarters in Chatsworth, California, a few days before the Consumer Electronics Show (CES) which is held every June in Chicago. I knew that DataSoft was a major CES exhibitor, so I expected to have a rushed and straightforward interview with Ketchum, to meet and talk with some of the other DataSoft team members, and to be politely sent on my way to write another of the success stories which are becoming so common in the home computer and electronics industry. It turned out instead to be one of the most interesting interviews I have undertaken.

Meeting me at the Burbank airport, Bridget Hardt brought the first ray of sunshine into this Southern California day. On the DataSoft team for only three months, she is Pat Ketchum's secretary. Bridget drove me through the freeway maze for the twenty minutes to the office.

Pat Ketchum's office is on the outside facing west, and has tinted windows for days when the Los Angeles sun really shines. Bridget introduces us and I settle into an easy chair on the other side of a modestly-large desk. Pat Ketchum and I begin to get acquainted.



ANTIC: You certainly have an impressive operation. How did DataSoft start?
KETCHUM: Actually, I was involved with a very successful distribution company called Unidata Investments. In 1980 Terry Koosed, Bill Morgan, and I tried to buy a software company, but Hayden Publishing ended up with it. We got so excited about what we learned, however, that we knew we wanted to be in this business. We were already into computer hardware with California Computer Systems. We were already into retailing and mailorder with H.W. Computers. And we were already into integrated circuits. So at Unidata we had all the ingredients to diversify, and it was my task to organize the new software company DataSoft. We incorporated on June 12, 1980.

Scott Llewellyn, the young Vice President of Marketing, popped his head around the office door and asked "What time do we have to be at the costume studio in Hollywood?" "Everyone should be there at one o'clock," Pat answered, looking at me and asking "You want to come?" I was curious.

ANTIC: I know that Clowns and Balloons is one of DataSoft's popular games, but what's happening?
KETCHUM: [Smiling and with a glint in his brown eyes] We have chartered a big paddle wheeler out of San Pedro for a DataSoft party in two weeks. The company is paying for Mark Twain era costumes, food, and drink. We will be celebrating that we met our quarterly sales goal, that CES is over, and that DataSoft is three years old.

Thinking that a trip to the costume studio might be a chance to gain insight into the "real people" aspects of the company, I ventured that, of course, I'd love to go. It was already becoming clear that these people operated as a team and that they not only worked hard together, they also (importantly) enjoyed each other's company outside of the business environment.

ANTIC: How big is DataSoft?
KETCHUM: We don't release financial figures, but presently we have fifty people on staff and occupy about 22,000 square

feet. And we have opened a new office in Milpitas [northern California] headed up by Gary Furr. We have grown 400% over last year's sales. Three years ago there was a "window" for microcomputer software start-up companies and we were there, but for the first six months, I would add, we lost a lot of money until we grew to understand the market. Since then we have been growing very fast.

ANTIC: Did you personally bring all these people together?
KETCHUM: Yes. We're like a big family, and it's something I really enjoy doing. I think that's why it has turned out so well, because it *is* a lot of fun! I'm not a programmer. I enjoy the sales and marketing aspects of the business. I like to deal with people and I'm good at negotiating.

Saul Bernstein and his wife Sally showed up, wondering when everyone was going to Hollywood for their costumes. Saul is a top-notch computer artist and helped with **MICROPAINTER** *in the early stages of DataSoft. He's a member of the Board and part of the family. A professor of art at Cal State University at Northridge, he takes the computer age seriously. Pat's wife, Julie, arrived and five of us piled into a diesel Mercedes.*

ANTIC: What sort of personal motivations drive you? Do you do this for money, fame, love?
KETCHUM: All of the above, but the most exciting thing is that we are really building something, a good company. It's a consumer company and very people-oriented. This orientation helps to sell DataSoft, and we have been able to acquire some very hot properties like **ZAXXON** and **Dallas**. I love to negotiate! For Dallas, a new adventure game based on the hit TV series, we dealt with Lorimar Productions for the marketing rights. They were tough negotiators and were very strict regarding quality control and who they dealt with. For ZAXXON, I negotiated directly with Dave Rosen, Chairman of the Board at Sega. I got to know this successful person very well, and he taught me a lot. The learning never stops.

ANTIC: It sounds like you are licensing much of your software. What's in the works now?
KETCHUM: We have also licensed the use of Heathcliff, America's top-syndicated cartoon cat, Mighty Mouse, the Terrytoon cartoon characters, and Bruce Lee. We are seriously diversifying our lines, and are creating divisions which will reach out to specific markets. The new "Gentry" line, for example, is for games and recreational programs, mainly produced by outside programmers, which we will sell very inexpensively. We have a serious home-management line, and we have children's educational software; that's where we will use a lot of the cartoon characters. DataSoft itself will remain the top-of-the-line label for the best games and recreational software.

At Western Costume Company, each employee underwent a metamorphosis. Suddenly the room was filled with riverboat captains, gamblers, and southern belles. Ted Hofmann, DataSoft's new Vice President of Finance, appeared in a broad-brimmed felt hat from behind a rack of clothes destined for the Santa Fe Opera; "I can't find my gun and holster," he mumbled. Saul Bernstein slipped into the French ambassador's scarlet-lined cape and left for the prop room on the sixth floor to get his Croix de Guerre. *I felt strangely displaced in this surreal warehouse of pretend things.*

ANTIC: Who does your software programming?
KETCHUM: We have fourteen in-house programmers who program for various machines in Assembly Language. I guess the average age is 20 to 25 years old. Some material is received from outside, particularly for the Gentry line, and if we market it, we pay royalties to the author. About 50% of the material submitted from outside is actually accepted.

ANTIC: There are a lot of young people who toy with the idea of becoming professional programmers. What sort of advice would you have for them?
KETCHUM: Go to school, or read books, and develop structure for your programs. We have seen a lot of programmers who are very good but their code has no structure. It's brittle, so if you remove one section, the whole thing falls apart. It's a question of discipline as much as anything else, and this is important. If you start something, finish it! And keep it flexible and organized. We advertise continually for programmers.

In a corner of the costume dressing room there were two little people (midgets) trying on Santa's dwarf outfits for a Toyota commercial being filmed somewhere where there was snow in June. People were running about and fitters and designers were chattering in classic Hollywood argot using words like "baby" and "sweetie".

ANTIC: What do you see in the future?
KETCHUM: Well, we're beginning to market our products on ROM cartridges now. MOON SHUTTLE from Nichibutsu for the Commodore 64 will be our first, followed by POO YAN for the ATARI under license from Konami. We were the first third-party software company to sell through Toys-R-Us and J.C. Penney's. There still isn't a large enough computer base to market with national TV commercials and magazine ads, but it is coming!

ANTIC: You began DataSoft by writing programs mostly for the ATARI. Will you continue to concentrate on ATARI software?
KETCHUM: ATARI software still makes up about 70% of our sales. But we have also developed Apple programs, and we have eight or nine programs we are marketing to and through Tandy. We are also producing software for Radio Shack under a private label arrangement. In the beginning, though, we saw the ATARI as being a good computer system which was easy to program, and we saw very few software companies supporting it. There was a vacuum and we filled it.

By the time the clothes rack was filled with outfits labeled "DataSoft", I had missed my plane back to San Francisco, but I had not missed the fun. And I had, for a brief moment in time, watched a very successful company from the inside.

ALAN ALDA

Atari names new spokesperson

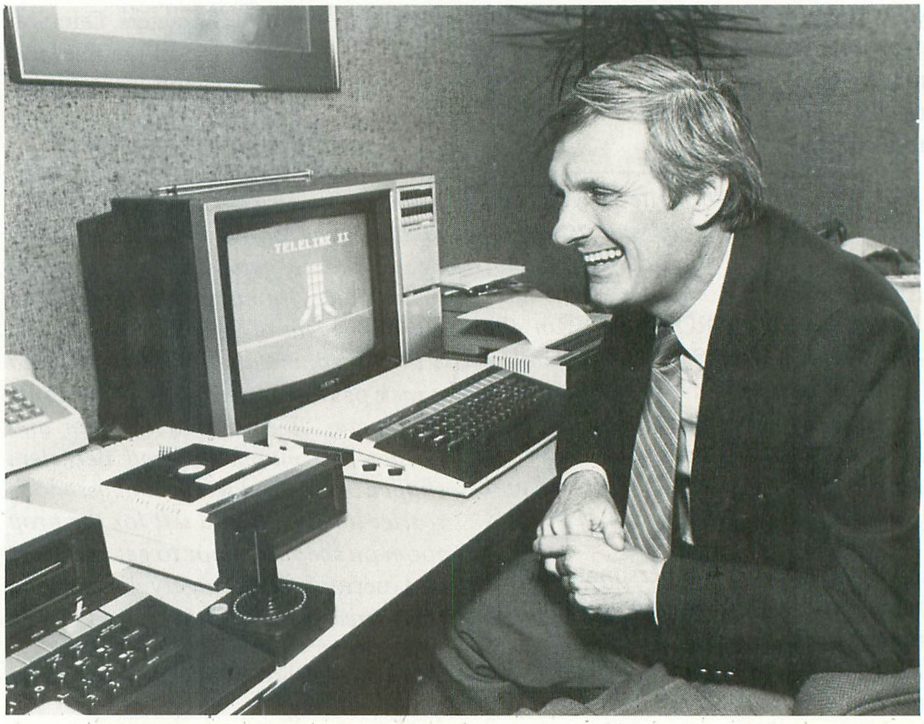
by ROBERT DeWITT

Alan Alda, certainly one of the best-liked and most-credible stars in the entertainment world, has signed with Atari, Inc. to be spokesperson for its computers for the next five years. He will represent Atari in TV advertising and public relations capacities.

The announcement was made by Atari President Raymond Kassar and by Warner Chairman Steven Ross at the Consumer Electronics Show in Chicago in June, where several new products in the XL line were unveiled. The arrangement with Alda is expected to more than match the celebrity-spokesman impact achieved by competing computer companies.

Although not previously an ATARI owner, Alda did have an unnamed computer he stopped using because it was too difficult to understand, "like being at the wise man's knee and not knowing his language," Alda is quoted as saying. Atari has supplied him with all its products, and he expects to find them easier to use.

Bruce Entin, Atari's Vice President for Press Relations, accompanied Alda to the Chicago announcement and helped him familiarize himself with the Atari line during a visit to Sunnyvale. "Alda is very interested in the computer, both as a source of fun and of education. He thinks its going to be our major learning tool for years to come. I know he was very impressed with our new LOGO when we showed it to him. He seemed to feel that ATARI was a computer he could understand," Entin reported.



Alda also commented on the power of the computer to bridge the gap between peoples and generations. "I was at a Thanksgiving dinner recently where a major topic for everyone was the strategy for clearing screens at Pac-Man. Atari knows how to entertain, and if you can keep them entertained, you can also teach."

Alan Alda has recently ended an 11-year association with the television serial M*A*S*H, for which he wrote and directed numerous episodes as well as acted the principal role of Hawkeye Pierce. No new creative projects for him have yet been announced, according to agent Martin Bregman, but the Atari assignment will only be a "small part of his total activities."

Atari sought Alda, Bregman stated, but Alda's acceptance was based on his positive judgement of the products Atari is offering. "Alan will never represent products he doesn't believe in," Bregman said.

Alan Alda's interest in family life and devotion to his own has been widely reported. He has three daughters, now grown; and he and his wife alternate between homes in New York and Los Angeles.

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TURN COAT

Only one color will survive

by TED MURDOCH

This article presents a short program that helps you learn the fundamentals of Graphics Modes 1 and 2, which are the text modes. When the program runs, it puts a four-colored block of O's on the screen, then randomly changes the color of each O until all the O's are the same color. What the program does is not as important as how much you can learn from it. If you follow my suggestions, you'll get some understanding of the character graphics sets, and be able to use tables in the ATARI BASIC Reference Guide to create other kinds of displays, with other characters.

The program has three parts. Lines 200 to 210 set initial conditions. Lines 220 to 275 draw the block of O's. Lines 285 to 325 select two different cells in the block at random, then replace the O in one cell with the O in the other. Sometimes this procedure results in a change of color of an O, sometimes not. If you let the program run long enough, it will change all the O's to one color, but you won't be able to tell in advance which color survives.

The program is organized for you to make some changes. Lines such as 200, 205, and 210 have only one command so that making changes will be easy. Line numbers allow intervals for suggested additions. Type in the program and RUN it. In Mode 2, you can use the text window to display short lines by pressing the [BREAK] key. Use the LIST command to list a line, type in a quick change, and RUN the program again. You can type in GRAPHICS 0:LIST 220,275 to view the part of the program that draws the block of O's.

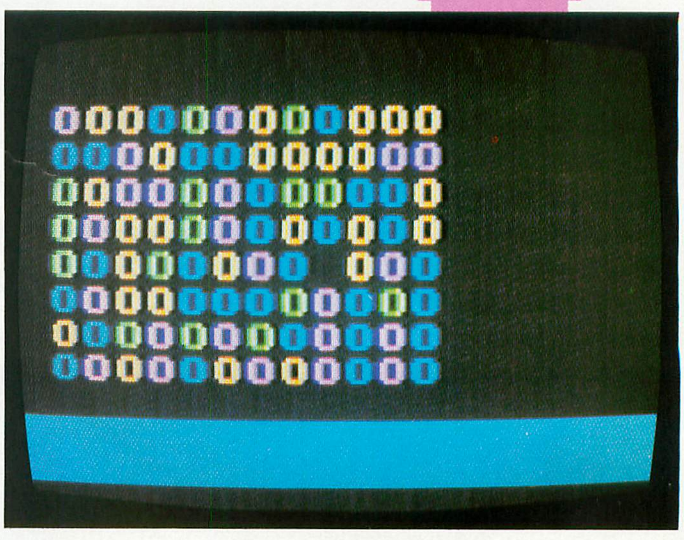
You can delete a line by typing the line number and pressing [RETURN]. Of course, it's usually a good idea to LIST the line number first, so that you can be sure it's the line you want to delete. Notice that the letter O is typed in a different way (upper and lower case; normal and reverse video) in each PRINT #6; command. Once you get the program running properly, SAVE it and prepare to make changes.

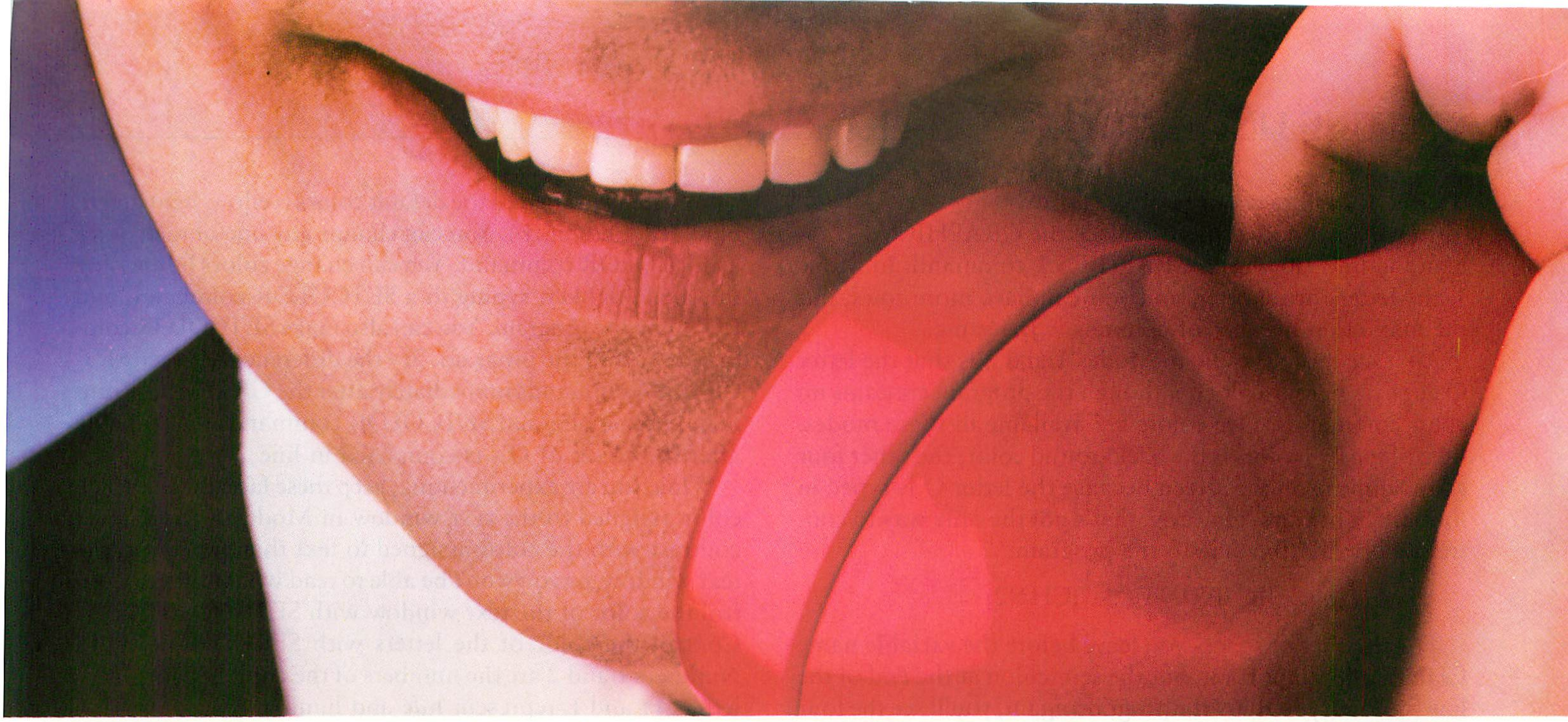
The first thing to look at is the relation between the row number and the column number as they appear in the POSITION command, and as the characters appear on the screen. No matter what names you give to the variables RN and CN, the POSITION command uses the first variable as a column number and the second variable as a row number. Note that the same order of variables is required when columns and rows are selected by the LOCATE command in line 310 and the POSITION commands in lines 315 and 320.

To get a clear understanding of columns, and other matters as well, make some changes in the number of rows (NROWS) in line 200, and in the number of columns (NCLMS) in line 205. If you try a number of rows greater than nine, the extra rows will be hidden behind the text window. If you try a number of rows greater than 11, or a number of columns greater than 19, you'll get error message 141. The ATARI counts from 0, so that the 12 row by 20 column limit for Mode 2 is exceeded after 11 and 19. This program counts from 1, so the first letter is in column 1, row 1, not column 0, row 0.

continued on page 18

Ted Murdoch is a technical writer, working for the last 17 years for manufacturers of commercial computers and equipment, including Xerox Sigma. He has recently come to the ATARI 800 from the TRS-80 and is interested in assembly language and LISP.





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TURN COAT *continued from page 16*

To see a Mode 1 display, replace the GRAPHICS 2 command in line 210 with a GRAPHICS 1 command. In Mode 1, the letters are shorter, and you can have more rows, but the maximum number of columns is the same.

An issue more specific to Modes 1 and 2 is that the letter O appears in four colors, although the program contains no color commands. Five colors are available in these modes. One of the five colors is the background color; the other four colors appear on the screen because the letter O is typed in four different ways. However, that's not the only way to control color. Add this line to the program.

```
311 PRINT "   ";CHN2;
```

The number of spaces you leave before the variable name CHN2 is not important, but the semicolon at the end of the line is. When you RUN the program again, you'll see the four numbers 79, 111, 207, and 239 repeated in the window in random sequence.

Those numbers appear in tables on pages 55 and 56 of the ATARI BASIC Reference Guide. The code for capital O is in column 2 of the Internal Character Set Table. The code number is listed as 47. Now look at Column 2 labelled Conversion 2, in Table 9.7, on the following page. Notice the expressions # + 32, # + 64, # + 160, and # + 192. If you substitute 47 for # in each of those expressions, and do the arithmetic, you'll get 79, 111, 207, and 239. This tells you that you could replace the four ways of typing O in the program with a form such as PRINT #6;CHR$(79), or one of the other values. But don't try that yet.

First, type in this command

```
211 POKE 756,226
```

and RUN the program once more. You still see multicolored O's all over the screen, but this time they are lower case, and are surrounded by yellow hearts. The same four numbers still appear in the window. Look at the table on page 55 of the Guide again. In Column 4, you find lower case o listed as number 111. If you perform the arithmetic for Conversion 4 in Table 9.7, you get the same four numbers — 79, 111, 207, and 239.

To unravel the mystery of the yellow hearts, look at the top of the other columns of the first table. At the top of Column 3, you see the heart (number 32); in the corresponding place in Column 1, you see a place for the space (number 0).

With a little arithmetic, you can now make some other characters appear on the screen in place of all those O's. You have a choice of four colors for each character. While you experiment, keep in mind that there are two distinct sets of 64 characters each in Modes 1 and 2. To return to the character set with capital O's, you can either delete line 211, or change the command to POKE 756,224. In the jargon of computers, the default set for Modes 1 and 2 is the set you get when you first turn on the system. Another way to get the default set is to POKE 756,224. To get the other set you must POKE 756,226.

You aren't limited to the default colors (yellow, light green, blue, red, and black). You can change any one of them with a SETCOLOR command. You can change colors by pressing the [BREAK] key, typing in a SETCOLOR command, and RUNning the program. You can also make SETCOLOR commands part of the program. Try the difference between SETCOLOR commands immediately after the GRAPHICS command in line 210, and SETCOLOR commands immediately after the block of O's is completed in line 275.

While you are experimenting, keep these facts in mind. The color assigned to the text window in Modes 1 and 2 must contrast with the color assigned to text that appears in the text window, or you won't be able to read what is there. Control the color of the text window with SETCOLOR 2,H,L. Control the color of the letters with SETCOLOR 1,H,L. Numbers 1 and 2 are the numbers of the color registers. The letters H and L represent hue and luminance.

You can also experiment with Modes 17 and 18 (1 + 16 and 2 + 16), which delete the text window (and the opportunity to use it as a means for changing the program).

You may find uses for this program other than a means to get familiar with Modes 1 and 2. If you have any interest in ecology or related subjects, you may have noticed that the program is a very simplified model of the extinction of species. Chance, in the form of the ATARI random number generator, reduces the number of members of one species, and increases the number of members of another. In this model, the two species may be identical. Even so, if you let the program RUN long enough, only one species remains. If you choose to watch this behavior, delete lines 315 and 320 of the program. Many of the tools for building more elaborate models are in this program. For information on simple models, refer to a book called *Laws of the Game*, by Eigen and Winkler. Perhaps you'll find it in your public library, as I did.

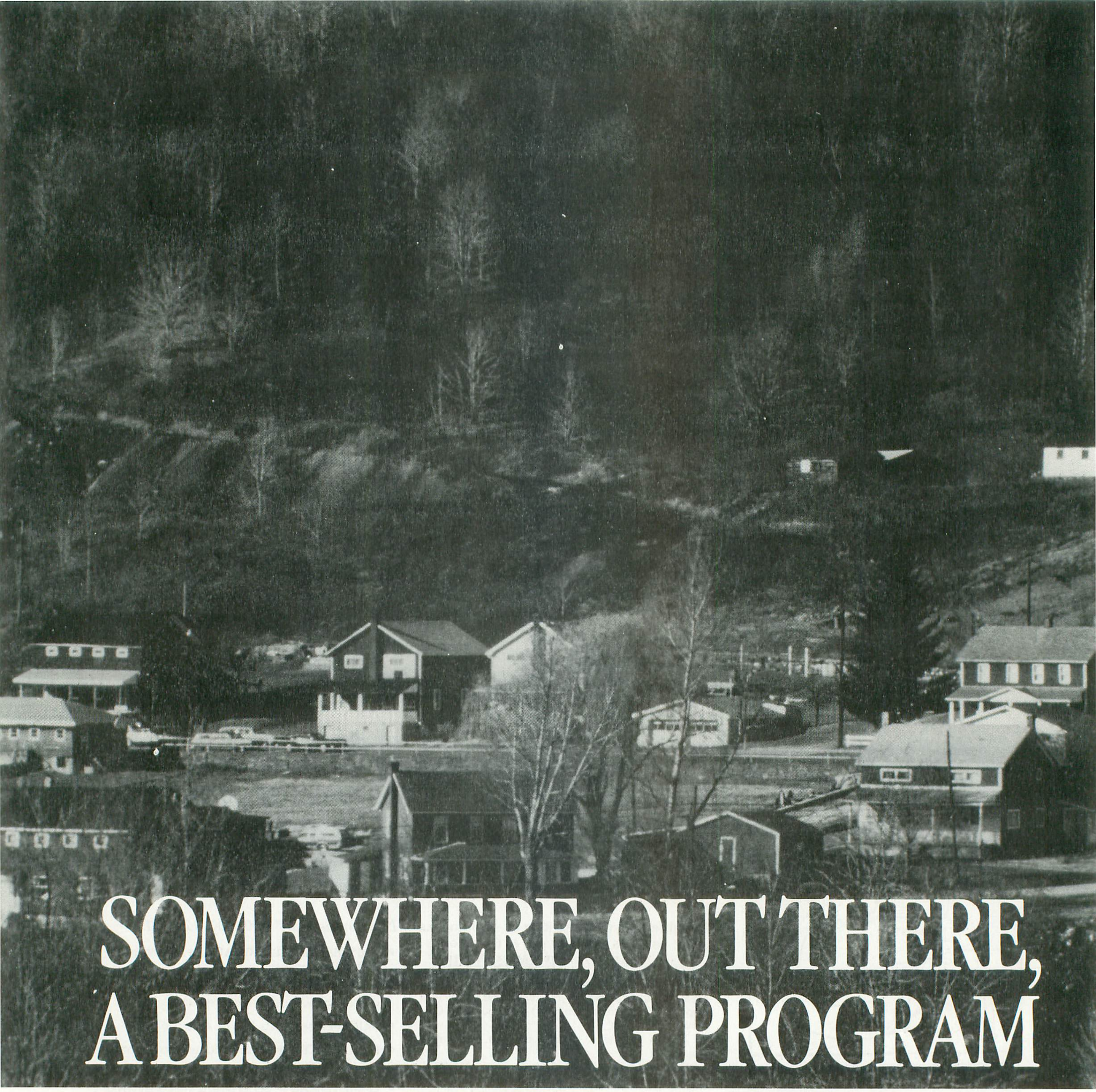
```
199 REM * Initialize number of rows an
d columns
200 NROWS=8
205 NCLMS=12
210 GRAPHICS 2
219 REM * Draw random array of cells
220 FOR RN=1 TO NROWS:FOR CN=1 TO NCLM
S
225 POSITION CN,RN
229 REM * Select cell type
230 R=INT(RND(0)*4)+1
235 ON R GOTO 240,250,260,270
240 PRINT #6;"O"
245 GOTO 275
250 PRINT #6;"o"
255 GOTO 275
260 PRINT #6;"O"
265 GOTO 275
270 PRINT #6;"o"
275 NEXT CN:NEXT RN
276 REM * End of initial array
284 REM * Select cell to remove
```

```
285 ROW1=INT(RND(0)*NROWS)+1:CLM1=INT(
RND(0)*NCLMS)+1
294 REM * Select cell to duplicate
295 ROW2=INT(RND(0)*NROWS)+1:CLM2=INT(
RND(0)*NCLMS)+1
304 REM * Check that cells are different
305 IF ROW1=ROW2 AND CLM1=CLM2 THEN GO
TO 295
309 REM * Find contents of cell to duplicate
310 LOCATE CLM2,ROW2,CHN2
314 REM * Remove cell
315 POSITION CLM1,ROW1:PRINT #6;" "
320 FOR T=1 TO 150:NEXT T
324 REM * Replace cell
325 POSITION CLM1,ROW1:PRINT #6;CHR$(CH
N2)
329 REM * Continue to remove and replace
330 GOTO 285
```

TYPO TABLE

Variable checksum = 245695

Line num range		Code	Length
199	- 245	NE	293
250	- 304	DW	336
305	- 330	ZY	242



WHERE IS IT?

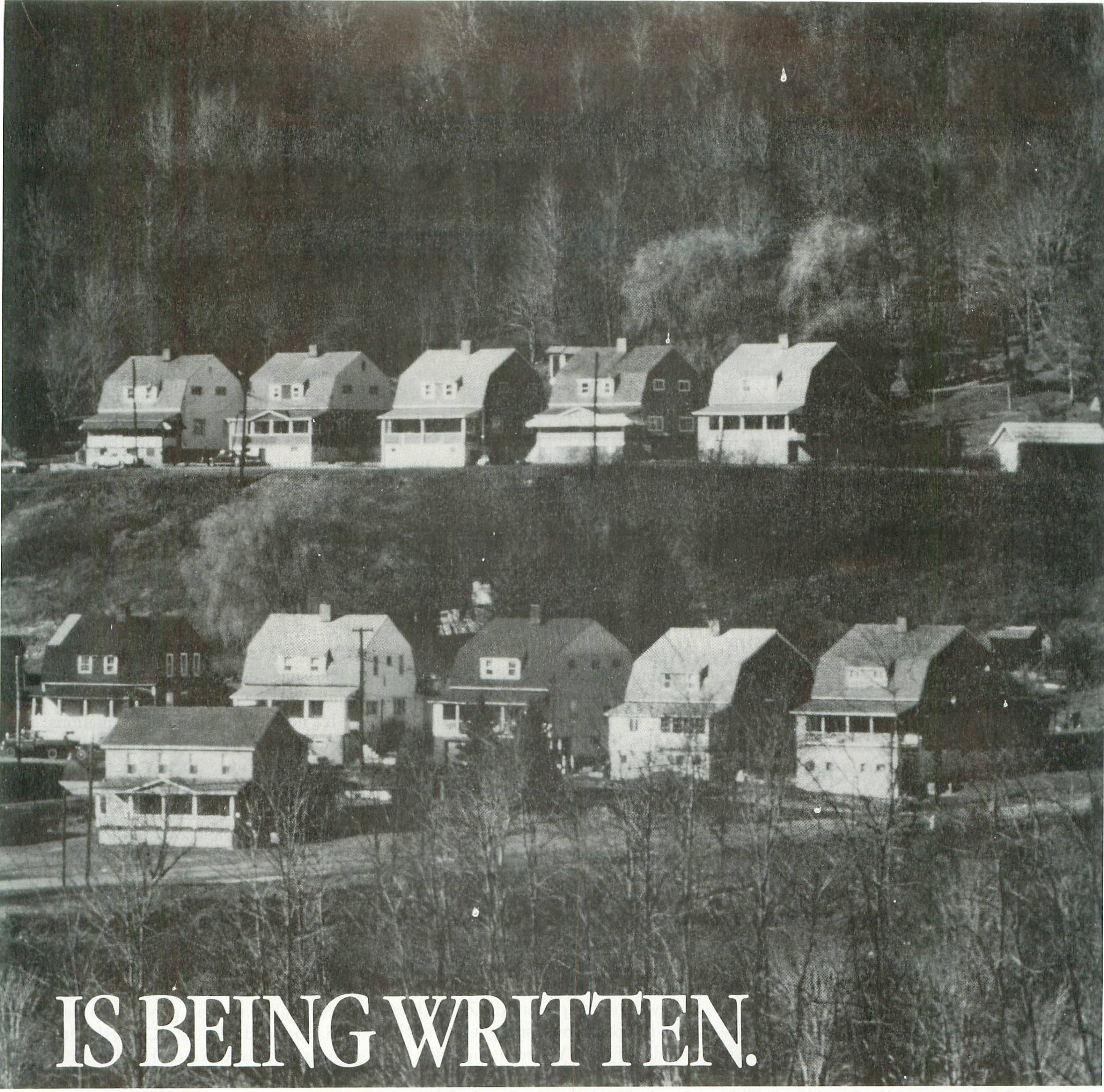
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3-D FUJI

Spin the symbol

by JERRY O'NEILL

Even people who aren't fans of arcade games are often attracted by the impressive graphics. Some games, like ZAXXON, have a three-dimensional effect.

This article can't teach you how to program anything like ZAXXON, but it will show you the principles of 3-D drawing with your ATARI. Using the programs listed here, you'll be able to create three-dimensional objects in computer memory, display them on the TV screen, and turn them to any position you choose.

One of these objects is the Atari symbol, known as "fuji," because it resembles Mount Fuji. Another is a barn. But, before we get into the programs, take a minute to review some basics.

THE SCREEN IS LIKE GRAPH PAPER

If you've owned an ATARI more than a few days, you probably realize that the graphics modes treat the TV screen like a piece of graph paper. You use PLOT and DRAWTO commands followed by X and Y values to make pictures. PLOT puts a single point on the screen, while DRAWTO draws a line to the specified point from the last point.

The X values set the horizontal position and the Y values set the vertical position. The top left corner of the screen is 0,0 — meaning X = 0 and Y = 0. This is true in every graphics mode.

The largest allowable numbers for X and Y vary, depending on the graphics mode you're using. In GRAPHICS 8 + 16 (GR. 24), the full-screen version of the ATARI's highest resolution mode, the X value for the right-hand edge of the screen is X = 319. The Y value for the bottom edge is Y = 191. Trying to PLOT or DRAWTO positions past X = 319 or Y = 191 will result in ERROR 141, "cursor out of bounds," or ERROR 3, "bad value." (The same if X or Y is less than zero.)

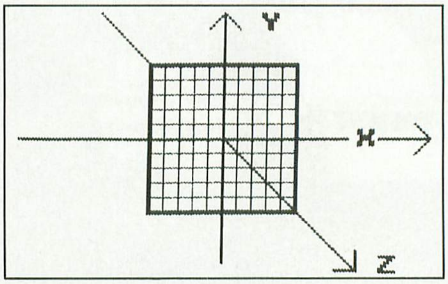


Figure 1. To show three-dimensional objects on a flat surface, we can use a synthetic Z axis running at a 45° angle to X and Y.

Even though the ATARI places 0,0 at the upper-left corner of the screen instead of the center, you'll notice it handles X in the usual way; it grows larger as you move from left to right. But Y acts the opposite of the standard way, becoming larger as you move toward the bottom instead of the top.

This isn't serious. You can change the values of X and Y with simple addition or subtraction if you want to plot Cartesian coordinates on the ATARI screen. What's harder is representing the third, or Z, axis that's required for three-dimensional images.

If we could represent the Z axis literally, it would come straight out of the middle of the TV screen. Picturing the screen as a piece of graph paper, imagine that the Z axis is a pencil pushed through the center, at right angles to the paper. Images that were truly three-dimensional would appear to be located at different distances along the pencil — they would have differing Z coordinates.

SHOWING 3-D ON A 2-D SCREEN

Without using holography, we can't show that kind of true 3-D image. To approximate the same effect on a flat TV screen we'll use what you might call a synthetic Z axis, angled at 45° to X and Y. In map-making terms, it runs from northwest to southeast. (Angles other than 45° can be used, and are, by artists and drafters, but 45° works fine.)

Plotting X,Y,Z coordinates on a flat X,Y screen turns out to be surprisingly simple. If X, Y, and Z are the object's three-dimensional coordinates and TX and TY are the values we'll plot on the screen, then:

TX = X + Z*sine(45°) = X + Z*0.707
TY = Y + Z*cosine(45°) = Y + Z*0.707
(The sine and cosine of 45° are the same.)

It's necessary to use these equations for each point, or each corner, of the object being drawn. To test them, we'll create a simple object — a square with the letter "A" on it, with arrows representing the X, Y, and Z axes. If you plot it using the TX and TY equations, it looks like Figure 2a. That's very reassuring; the equations really work!

But it isn't very satisfactory to look at three-dimensional objects from just a single point of view. If a friend hands you something interesting, whether it's the latest Walkman tape player or a new variation on the Rubik's Cube, the first thing you do is turn it over and around, to look at all sides. Ideally, our 3-D graphics program should do the same. And it does.

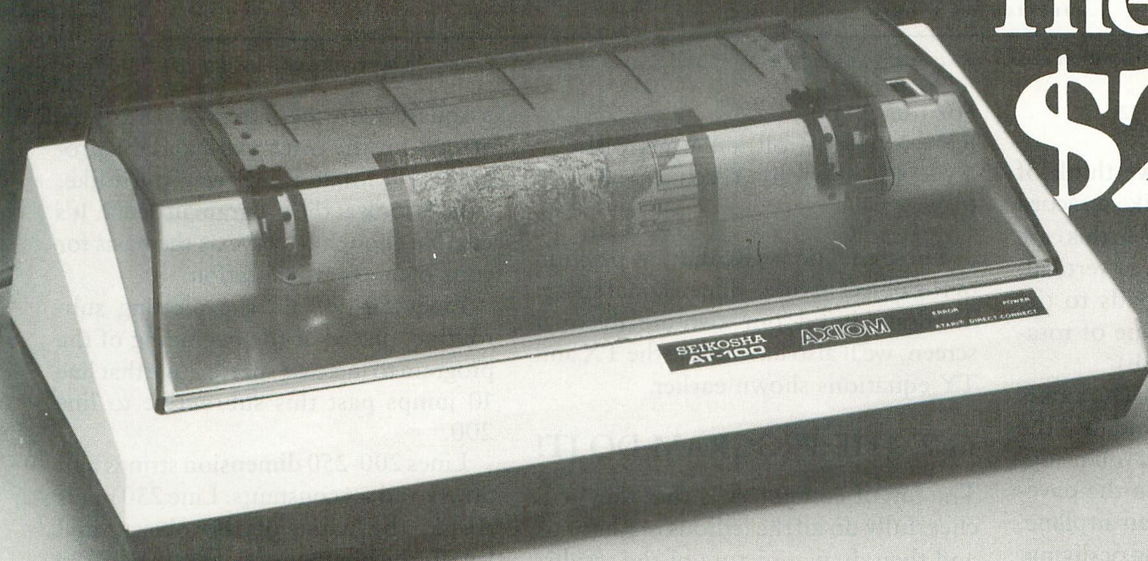
YAW, PITCH, AND ROLL

Since there are three axes in a three-dimensional world, there are three different ways objects can turn. (And, of course, they can turn in any combination of the three.)

continued on page 24

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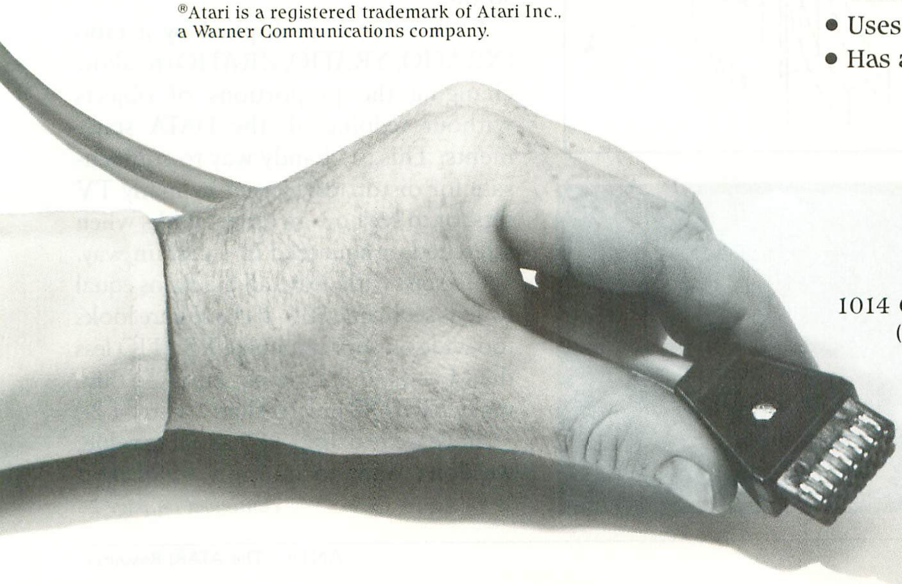


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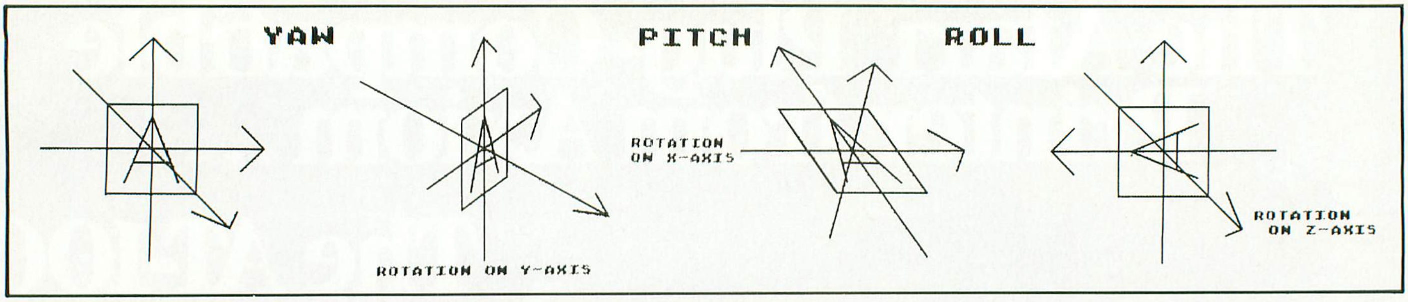


Figure 2. This simple demonstration object has arrows marking the X, Y, and Z axes in 2a; 2b, 2c, and 2d demonstrate yaw, pitch, and roll.

3-D FUJI *continued from page 22*

Perhaps the movement we think of first is a spinning motion, like a record on a turntable or a child's top. In this case the object is turning on its Y, or vertical, axis. (The Y axis corresponds to the turntable's spindle.) This type of rotation is called *yaw* (Figure 2b).

Rotation on the horizontal (X) axis is called *pitch* (Figure 2c), and it's the motion you experience when you're jogging and trip over a crack in the pavement. You pitch forward. In an airplane, pitch is equivalent to climbing or diving.

The third rotation is around the Z axis and is called *roll* (Figure 2d). Using our piece of graph paper with the pencil stuck through it as an example, if you spin the paper on the pencil, the movement is roll. Probably a better example is a rowboat that's parallel to the wake of a motorboat; as the waves from the wake pass the rowboat, it rolls from side to side. (In fact, sailors have used the terms yaw, pitch, and roll for at least 200 years.)

The bad news about calculating yaw, pitch, and roll movements is that it requires matrix multiplication, a subject not familiar to many of us. The good news is that the matrixes can be boiled down to some pretty simple equations.

If X, Y, and Z are the three-dimensional coordinates for a point on the object, and we want to rotate it, we just use these equations. RX, RY, and RZ are the rotated coordinates.

For yaw
RX = X*cosine(yaw) + Z*sine(yaw)
RY = Y
RZ = X*–sine(yaw) + Z*cosine(yaw)

For pitch
RX = X
RY = Y*cosine(pitch) + Z*–sine(pitch)
RZ = Y*sine(pitch) + Z*cosine(pitch)

For roll
RX = X*cosine(roll) + Y*sine(roll)
RY = X*–sine(roll)*Y*cosine(roll)
RZ = Z

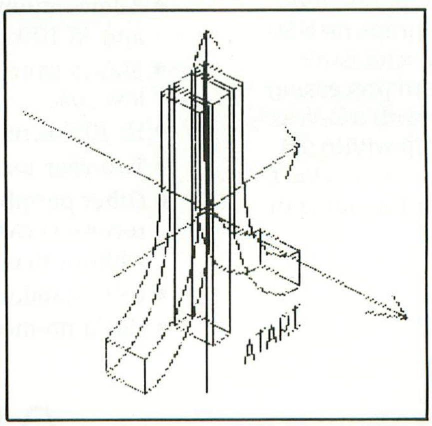
These equations give the new position of the object in three-dimensional space. To draw it on our two-dimensional screen, we'll also have to use the TX and TY equations shown earlier.

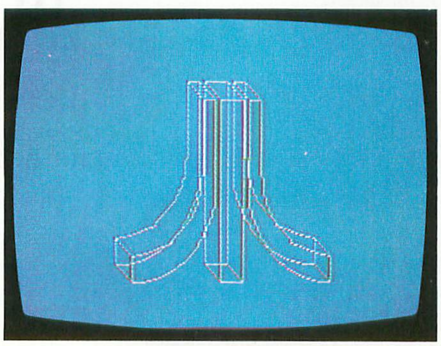
LET THE PROGRAM DO IT!

The joy of computers is that they will cheerfully do all the tedious math for us and then draw a picture of the results. Listing 1 is an example of a fairly short program that demonstrates this. It will run on a 16K cassette-based ATARI.

The program uses DATA statements to define the object that's shown in the illustrations of yaw, pitch, and roll. It's a square with the letter "A" and three arrows for the three axes, and the program will rotate it any way you'd like.

Figure 3. 3-D Atari symbol with X, Y, and Z axes.





Let's look at the program in detail. It's flexible enough to serve as the basis for your own experimentation.

Lines 50-190 are the plotting subroutine, placed at the beginning of the program to increase speed. Note that line 10 jumps past this subroutine to line 200.

Lines 200-250 dimension strings and arrays and set constants. Line 230 reads ALT$, the name of the object, and LAST, the number of data points in the object. Then it dimensions X, Y, and Z arrays equal to LAST.

This approach allows using the same program for very complex objects with many data points, as long as you don't have so many that you run out of memory. Just be sure that your first data line contains the name of the object and the number of points.

The section from line 300 to 380 reads and manipulates the X,Y,Z data. Line 320 sets all elements of arrays equal to zero. Line 350 reads each set of X,Y,Z values and line 360 puts them in the arrays. The first point becomes X(1),Y(1), Z(1); the second is X(2),Y(2),Z(2), and so on.

Each value is multiplied by a ratio (XRATIO, YRATIO, ZRATIO) to allow changing the proportions of objects without redoing all the DATA statements. This is a handy way to compensate for distortion caused by many TV sets, or to see how an object looks when stretched or squeezed in a certain way.

(To start with, leave all the ratios equal to 1, as set in line 330. If the square looks too wide on your set, make XRATIO less than 1 — try 0.8. If the square is too thin, make XRATIO greater than 1 — try 1.2.)

Since we're using –999 as a flag value, we don't want to multiply –999 by a

continued on page 26

Correction.



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3-D FUJI *continued from page 24*

ratio. Line 370 takes care of that.

Line 390 initializes yaw, pitch, and roll to 0°. Lines 400-430 let you select the auto-rotate routine or manual settings.

The auto-rotate routine at lines 600-700 sets yaw, pitch, and roll values to show five different positions for each axis. You can experiment with different numbers in the DIRECTION and TURN loops to get more or fewer steps. Changing the values of 75 or 60 degrees in lines 630-650 will alter the amount of rotation between steps.

After the auto-rotate routine is over, line 710 sets MODE = 2 for manual settings. (The MODE variable does not refer to a graphics mode.) Lines 720 to 820 allow entering your choice of yaw, pitch, and roll values, in degrees. Note that you can turn the object on two or all three axes at the same time, if you wish, which the auto-rotate routine doesn't do. Line 830 computes sine and cosine values for yaw, pitch, and roll movements.

Lines 840-860 remind you to press any key when you're done looking at the picture. Line 870 gets rid of the code for the last key pressed (in memory location 764) and goes to the plotting subroutine. Upon returning from the subroutine, line 880 sends you back to enter new data at line 790.

The DATA statements at lines 2000-2050 are sets of X,Y,Z values except for line 2000. This contains the name of the object (read into ALT$) and the number of data points (read into LAST).

Now let's look at the plotting subroutine, lines 50-190. Line 50 sets GRAPHICS 24 (full screen 8 + 16) and sets the background color to black. Line 60 sets FLAG = 0, to indicate that the first point should be a PLOT command. (FLAG = 1 means DRAWTO.) It also sets a TRAP 190, to prevent the program from crashing if it tries to plot any points beyond the screen boundaries.

Line 70 begins the drawing loop, working with each set of X,Y,Z coordinates from the array in turn. If Y = 999, it's a flag, not a value to be plotted; line 90 takes care of that.

Line 100 begins the math, computing the X,Y,Z position for yaw. Lines 110-120 do the same for pitch and roll. Lines 130 and 140 PLOT or DRAWTO, depending upon FLAG = 0 or FLAG = 1. These lines also compute the X,Y equivalents of X,Y,Z by multiplying by the sine and cosine of 45°, C, or 0.707. HC and VC are the horizontal center and vertical center of the screen, 160 and 90. (This allows setting the object's X,Y,Z coordinates with 0,0,0 at the center, which makes life simpler.)

Line 160 gives a beep to remind us the plotting is complete. If we're in MODE = 2, manual settings, line 170 waits for a key to be pressed before it will move on. Line 180 gets rid of the key code in memory location 764 and returns from the subroutine.

Line 190 is used only if a plotting error calls the TRAP 190 command. Even if your object falls within the screen boundaries when it's not rotated, certain values of yaw, pitch, and roll may move parts of it off the screen. If this happens, generating ERROR 141 or ERROR 3, line 190 sets FLAG = 0, so the next point will be PLOT instead of DRAWTO. (This eliminates drawing an unwanted line from the last legal point on the screen.) Then line 190 resets the TRAP and returns to the next point in the drawing loop. If *all* the points in your object fall outside the screen boundaries, you end up with a blank screen.

ONCE MORE, WITH EMBELLISHMENTS

Listing 2 is a more ambitious program that draws the Atari symbol in 3-D, or allows you to select views of a barn with silo, instead. It requires a 48K system.

Note that many of the lines from Listing 1 can be reused. In some cases you'll have to change the line numbers.

The program is thoroughly explained with REM statements, so I won't repeat them here. To save typing and make the program run somewhat faster, eliminate all REMs (line numbers ending in 9).

Lines 290-530 enter the Atari symbol X,Y,Z data into arrays. The routine reads DATA statements several times by using RESTORE commands. (This approach saves typing 13 more DATA lines, but requires more program lines. Was the trade-off worth it? I'm not sure.) Note an important difference in these DATA lines, 1000-1110; they contain only X and Y values. The Z values are entered into the array at line 270, where Z =–8 (for the back portions of the symbol). Lines 290-530 change Z to + 8 for the front parts of the symbol.

DATA lines 2000-2160 are for the barn. These lines can be used as is with the short program in Listing 1, if desired. Note that the arrays for the barn data need about 2.7 Kbytes of memory, though; on a small system you may run out of memory.

CREATING YOUR OWN OBJECTS

Using graph paper, imagination, and patience, you can draw three-dimensional objects and enter them into DATA statements so these programs will draw them for you. The barn took about an hour to do, drawing the front, back, left side, right side, and top views.

Remember to center the object at 0,0,0. As much as possible, draw the outline in a continuous line — a series of DRAWTOs rather than using many PLOTs. This is like the puzzle where you try to draw an envelope without lifting the pencil from the paper.

There are a couple of reasons for this. First, using a PLOT and DRAWTO to define a new line means the program has to calculate positions for two points, while extending an existing line with DRAWTO requires only one set of calculations. Secondly, the end of each line requires entering –999,–999,–999, which uses 18 bytes of memory in the array.

Don't worry too much about proportions. If you're off a bit, or if your TV distorts the shape, use the XRATIO, YRATIO, and ZRATIO variables to alter the shape when reading the DATA statements. An XRATIO greater than 1 will make the object wider; less than 1 will squeeze it narrower. Changing the YRATIO makes the shape taller or shorter, and ZRATIO makes it fatter or thinner (along the Z axis). Notice that line 930 of Listing 3 sets XRATIO = 2 because the barn looks too square if XRATIO = 1 . . . at least on my TV set.

If you try these programs and find that three-dimensional drawing really appeals to you, you may want to buy a commercial program. Atari World, in particular, includes utility programs for entering data and uses machine language to draw pictures with impressive speed.

continued on page 28

3-D FUJI *continued from page 26* *Listing 1*

```
1 REM BY JERRY O'NEILL, 261 ROSLYN STR
EET, ROCHESTER, NY 14619...5/83
10 GOTO 200
49 REM SUBROUTINE PLOTS SHAPE
50 GRAPHICS 24:SETCOLOR 2,0,0:COLOR 1
60 FLAG=0:TRAP 190
70 FOR I=1 TO LAST
80 X=X(I):Y=Y(I):Z=Z(I)
90 IF Y=-999 THEN FLAG=0:GOTO 150
100 TX=X*CSYW+Z*SNYW:TY=Y:TZ=X*-SNYW+Z
*CSYW:X=TX:Y=TY:Z=TZ
110 IF PITCH<>0 THEN TY=Y*CSPT+Z*-SNPT
:TZ=Y*SNPT+Z*CSPT:X=TX:Y=TY:Z=TZ
120 IF ROLL<>0 THEN TX=X*CSRL+Y*SNRL:T
Y=X*-SNRL+Y*CSRL:TZ=Z
130 IF FLAG=0 THEN PLOT TX+C*TZ+HC,TY+
C*TZ+VC:FLAG=1:GOTO 150
140 DRAWTO TX+C*TZ+HC,TY+C*TZ+VC
150 NEXT I
160 FOR DEL=1 TO 100:SOUND 0,121,10,6:
NEXT DEL:SOUND 0,0,0,0
170 IF PEEK(764)=255 AND MODE=2 THEN 1
70
180 POKE 764,255:RETURN
190 FLAG=0:TRAP 190:GOTO 150
199 REM INITIALIZING SECTION
200 GRAPHICS 2:POKE 752,1
210 POSITION 3,2:? #6;"atari graphics"
:POSITION 7,5:? #6;"IN 3-D"
230 DIM ALT$(15):READ ALT$:READ LAST:D
IM X(LAST),Y(LAST),Z(LAST)
240 C=0.707:HC=160:VC=90:MODE=1:CH=1
250 DEG
299 REM READ SHAPE DATA
300 POKE 752,1:?:? "One moment please
.":? "Reading data for ";ALT$
320 FOR I=0 TO LAST: X(I)=0:Y(I)=0:Z(I)
=0:NEXT I
329 REM 'RATIOS' ALLOW SCALING SHAPE.
ADJUST XRATIO TO COMPENSATE SHAPE SHOW
N ON YOUR TV SCREEN
330 XRATIO=1:YRATIO=1:ZRATIO=1
340 FOR I=1 TO LAST
350 READ X,Y,Z
360 X(I)=X*XRATIO:Y(I)=Y*YRATIO:Z(I)=Z
*ZRATIO
370 IF X=-999 THEN X(I)=X:Y(I)=Y:Z(I)
=Z
380 NEXT I
390 YAW=0:PITCH=0:ROLL=0:MODE=1
400 ?:? "For auto-rotate routine, pre
ss START ":? "For manual settings, pr
ess SELECT "
410 IF PEEK(53279)=5 THEN MODE=2:GOTO
720
420 IF PEEK(53279)=6 THEN 600
430 GOTO 410
599 REM AUTO-ROTATE ROUTINE: YAW, PITC
H, ROLL--5 POSITIONS FOR EACH
600 FOR DIRECTION=1 TO 3
610 FOR TURN=0 TO 4
620 YAW=0:PITCH=0:ROLL=0
630 IF DIRECTION=1 THEN YAW=TURN*75
640 IF DIRECTION=2 THEN PITCH=TURN*60
650 IF DIRECTION=3 THEN ROLL=TURN*60
660 CSYW=COS(YAW):SNYW=SIN(YAW):CSPT=C
OS(PITCH):SNPT=SIN(PITCH):CSRL=COS(ROL
L):SNRL=SIN(ROLL)
670 GOSUB 50
680 FOR DEL=1 TO 1000:NEXT DEL
690 NEXT TURN
700 NEXT DIRECTION
709 REM END OF AUTO-ROTATE; NOW MANUAL
 MODE
710 MODE=2
720 TRAP 810
790 GRAPHICS 0
800 ?:?:? "The last display used val
ues of":?:? "YAW=";YAW:? "PITCH=";PIT
CH:? "ROLL=";ROLL
810 TRAP 810:?:?:? "Enter desired ne
w angles":?:? "of yaw, pitch, and rol
l.":?
820 INPUT YAW,PITCH,ROLL
830 CSYW=COS(YAW):SNYW=SIN(YAW):CSPT=C
OS(PITCH):SNPT=SIN(PITCH):CSRL=COS(ROL
L):SNRL=SIN(ROLL)
840 GRAPHICS 0:POKE 752,1
850 SETCOLOR 2,3,4:?:?:?:?:? "After t
he image is drawn,":?:? "press any ke
y to draw another."
860 FOR DEL=1 TO 1000:NEXT DEL
870 POKE 764,255:GOSUB 50
880 GOTO 790
1999 REM LETTER A WITH 3D ARROWS
2000 DATA 3-D LETTER A,30
2010 DATA -12,15,0,0,-15,0,12,15,0,8,6
,0,-8,6,0,-999,-999,-999
2020 DATA -20,20,0,20,20,0,20,-20,0,-2
0,-20,0,-20,20,0,-999,-999,-999
2030 DATA -50,0,0,50,0,0,40,10,0,50,0,
0,40,-10,0,-999,-999,-999
2040 DATA 0,50,0,0,-50,0,-10,-40,0,0,-
50,0,10,-40,0,-999,-999,-999
2050 DATA 0,0,-50,0,0,50,-10,0,40,0,0,
50,10,0,40,-999,-999,-999
```

TYPO TABLE

Variable checksum = 1067658

Line num range		Code	Length
1	- 130	VN	480
140	- 250	NN	478
299	- 400	NF	544
410	- 670	BC	398
680	- 840	SU	389
850	-2050	LB	530

Listing 2

```
1 REM BY JERRY O'NEILL,261 ROSLYN STRE
ET,ROCHESTER,NY 14619,5/83
2 REM SHOWS ROTATION IN ALL 3 AXES FOR
 ATARI LOGO AND BARN WITH SILO
10 GOTO 200
49 REM SUBROUTINE PLOTS SHAPE
50 GRAPHICS 24:SETCOLOR 2,0,0:COLOR 1
59 REM FLAG=0 MEANS PLOT; FLAG=1 MEANS
 DRAWTO. TRAP 190 FOR LINES PAST EDGE
OF SCREEN
60 FLAG=0:TRAP 190
69 REM VARIABLE 'LAST' ALLOWS DATA BAS
ES WITH VARYING NUMBERS OF POINTS
70 FOR I=1 TO LAST
80 X=X(I):Y=Y(I):Z=Z(I)
89 REM -999 INDICATES NEXT VALUE WILL
BEGIN A NEW LINE, SO FLAG=0 FOR PLOT I
NSTEAD OF DRAWTO
90 IF Y=-999 THEN FLAG=0:GOTO 150
99 REM CALCULATE YAW; ROTATION ON Y (V
ERTICAL) AXIS
100 TX=X*CSYW+Z*SNYW:TY=Y:TZ=X*-SNYW+Z
*CSYW:X=TX:Y=TY:Z=TZ
109 REM CALCULATE PITCH; ROTATION ON X
 (HORIZONTAL) AXIS
110 IF PITCH<>0 THEN TY=Y*CSPT+Z*-SNPT
:TZ=Y*SNPT+Z*CSPT:X=TX:Y=TY:Z=TZ
119 REM CALCULATE ROLL; ROTATION ON Z
AXIS (AXIS THAT COMES OUT FROM PLANE O
F SCREEN)
120 IF ROLL<>0 THEN TX=X*CSRL+Y*SNRL:T
Y=X*-SNRL+Y*CSRL:TZ=Z
129 REM IF FLAG=0 THEN NEW LINE, SO PL
OT FIRST POINT
130 IF FLAG=0 THEN PLOT TX+C*TZ+HC,TY+
C*TZ+VC:FLAG=1:GOTO 150
139 REM IF FLAG=1 THEN CONTINUE EXISTI
NG LINE; DRAWTO NEXT POINT
140 DRAWTO TX+C*TZ+HC,TY+C*TZ+VC
150 NEXT I
159 REM SOUND INDICATES PICTURE IS DON
E
160 FOR DEL=1 TO 100:SOUND 0,121,10,6:
NEXT DEL:SOUND 0,0,0,0
169 REM IF IN MANUAL MODE, WAIT FOR AN
Y KEY TO BE PRESSED
170 IF PEEK(764)=255 AND MODE=2 THEN 1
70
179 REM GET RID OF KEY PRESSED AND RET
URN FROM SUBROUTINE
180 POKE 764,255:RETURN
189 REM TRAP ERRORS FOR LINES PAST EDG
E OF SCREEN (ERROR 141) AND SET FLAG T
O PLOT NEXT POINT
190 FLAG=0:TRAP 190:GOTO 150
199 REM INITIALIZING SECTION
200 GRAPHICS 2:POKE 752,1
210 POSITION 3,2:? #6;"atari graphics"
:POSITION 7,5:? #6;"IN 3-D"
220 ? "One moment, please..."
229 REM FIRST DATA STATEMENT INDICATES
 NUMBER OF POINTS, STORED IN VARIABLE
 'LAST'
230 READ LAST:DIM X(LAST),Y(LAST),Z(LA
ST),ALT$(15)
238 REM C=SIN & COS OF 45 DEGREES; HC=
HORIZONTAL CENTER OF IMAGE; VC=VERTICA
L CENTER
239 REM MODE=1 FOR AUTOMATIC DEMO, 2 F
OR MANUAL CONTROL; CH=1 TO CHOOSE ATAR
I LOGO, CH=2 FOR BARN OR OTHER SHAPE
240 C=0.707:HC=160:VC=90:MODE=1:CH=1
250 DEG
260 SOUND 0,121,10,4:SOUND 1,96,10,4:S
OUND 2,81,10,4
269 REM INITIALIZE ARRAYS; X AND Y=0,Z
=-8
270 FOR I=0 TO 243:X(I)=0: Y(I)=0:Z(I)=
-8:NEXT I
280 SOUND 0,243,10,4:SOUND 1,193,10,4:
SOUND 2,162,10,4
289 REM READ DATA 4 TIMES FOR 4 CURVED
 PARTS OF LOGO
290 FOR SHAPE=1 TO 4
300 RESTORE 1010
310 FOR I=1 TO 49
320 READ X,Y
329 REM CHANGE COORDINATES FOR 4 CURVE
S
330 IF SHAPE=1 THEN X(I)=X:Y(I)=Y
340 IF SHAPE=2 THEN X(I+49)=X:Y(I+49)=
Y:Z(I+49)=8
350 IF SHAPE=3 THEN X(I+98)=-X:Y(I+98)
=Y
360 IF SHAPE=4 THEN X(I+147)=-X:Y(I+14
7)=Y:Z(I+147)=8
370 NEXT I
380 NEXT SHAPE
389 REM READ DATA FOR 2 STRAIGHT PARTS
 OF LOGO
390 FOR SHAPE=0 TO 1
400 RESTORE 1050
410 FOR I=1 TO 6
420 READ X,Y
430 X(196+I+SHAPE*6)=X:Y(196+I+SHAPE*6
)=Y:IF SHAPE=1 THEN Z(202+I)=8
440 NEXT I
450 NEXT SHAPE
459 REM READ DATA FOR CONNECTING LINES
 BETWEEN FRONT AND BACK PARTS OF LOGO
460 FOR I=209 TO 242 STEP 3
470 READ X,Y
480 X(I)=X:X(I+1)=X:X(I+2)=-999:Y(I)=Y
:Y(I+1)=Y:Y(I+2)=-999:Z(I+1)=8
490 NEXT I
499 REM READ DATA FOR WORD 'ATARI'
500 FOR I=245 TO 278
510 READ X,Y
520 X(I)=X:Y(I)=Y:Z(I)=8
530 NEXT I
539 REM FADE OUT SOUND
540 FOR VOL=4 TO 0 STEP -0.02:SOUND 0
,243,10,VOL:SOUND 1,193,10,VOL:SOUND 2,
162,10,VOL:NEXT VOL
549 REM GIVE USER A CHOICE OF DISPLAY
ROUTINES
```

continued on next page

```
550 SETCOLOR 2,12,4:?:?:? "For auto-
rotate routine, press START "
560 ? "For manual settings, press SEL
ECT "
569 REM PRESSING START SETS MODE=1
570 IF PEEK(53279)=6 THEN MODE=1:GOTO
600
579 REM PRESSING SELECT SETS MODE=2, S
KIPS AUTO-ROTATE ROUTINE
580 IF PEEK(53279)=5 THEN MODE=2:GOTO
710
590 GOTO 570
599 REM AUTO-ROTATE ROUTINE: YAW, PITC
H, ROLL--5 POSITIONS FOR EACH
600 FOR DIRECTION=1 TO 3
610 FOR TURN=0 TO 4
620 YAW=0:PITCH=0:ROLL=0
630 IF DIRECTION=1 THEN YAW=TURN*75
640 IF DIRECTION=2 THEN PITCH=TURN*60
650 IF DIRECTION=3 THEN ROLL=TURN*60
659 REM LINE 660 CALCULATES SIN & COS FOR YA
W, PITCH, AND ROLL VALUES
660 CSYW=COS(YAW):SNYW=SIN(YAW):CSPT=C
OS(PITCH):SNPT=SIN(PITCH):CSRL=COS(ROL
L):SNRL=SIN(ROLL)
669 REM GO TO PLOTTING SUBROUTINE
670 GOSUB 50
679 REM GIVE THE USER SOME TIME TO LOO
K AT DISPLAY
680 FOR DEL=1 TO 1000:NEXT DEL
690 NEXT TURN
700 NEXT DIRECTION
709 REM ALL DONE WITH AUTO-ROTATE DEMO
, SO SET MODE=2
710 MODE=2:IF CH=2 THEN 790
719 REM TRAP 810 TRAPS DATA ENTRY ERRO
RS FOR YAW, PITCH, ROLL
720 TRAP 810
729 REM READ NAME OF ALTERNATE SHAPE
730 READ ALT$
739 REM CH=2 MEANS SHOW ALTERNATE SHAP
E INSTEAD OF LOGO, SO SKIP LINES 750-7
80
740 IF CH=2 THEN 790
750 GRAPHICS 0
760 ?:?:? "To see an ATARI logo, ent
er 1":?:? "To see a(n) ";ALT$;", ente
r 2"
770 INPUT CH
779 REM IF CH=2, THIS IS THE FIRST TIM
E FOR THE NEW SHAPE, SO READ DATA
780 IF CH=2 THEN 900
790 GRAPHICS 0
800 ?:?:? "The last display used val
ues of":?:? "YAW=";YAW:? "PITCH=";PIT
CH:? "ROLL=";ROLL
809 REM TRAP IF BAD ENTRIES FOR YAW, P
ITCH, ROLL
810 TRAP 810:?:?:? "Enter desired ne
w angles":?:? "of yaw, pitch, and rol
l.":?
820 INPUT YAW,PITCH,ROLL
829 REM CALCULATE SIN & COS FOR YAW, P
ITCH, AND ROLL
830 CSYW=COS(YAW):SNYW=SIN(YAW):CSPT=C
OS(PITCH):SNPT=SIN(PITCH):CSRL=COS(ROL
L):SNRL=SIN(ROLL)
840 GRAPHICS 0:POKE 752,1
849 REM REMIND USER THAT IN MANUAL MOD
E YOU MUST PRESS A KEY FOR NEW IMAGE
850 SETCOLOR 2,3,4:?:?:?:? "After t
he image is drawn,":?:? "press any ke
y to draw another."
860 FOR DEL=1 TO 1000:NEXT DEL
869 REM GET RID OF LAST KEY PRESSED; G
O TO PLOTTING SUBROUTINE
870 POKE 764,255:GOSUB 50
879 REM AFTER PLOTTING, ASK USER FOR C
HOICES FOR NEXT IMAGE
880 GOTO 740
899 REM READ DATA FOR ALTERNATE SHAPE
900 POKE 752,1:?:?:? "One moment, pl
ease..."
909 REM READ NUMBER OF DATA POINTS
910 READ LAST
919 REM SET ARRAYS EQUAL TO ZERO
920 FOR I=0 TO LAST:X(I)=0:Y(I)
=0:Z(I)=0:NEXT I
928 REM 'RATIOS' ALLOW SCALING SHAPE.
ADJUST XRATIO TO COMPENSATE SHAPE SHOW
N ON YOUR TV SCREEN
929 REM LARGER VALUES (RATIO=4) STRETC
H OUT IMAGE ALONG X,Y,Z AXIS; SMALLER
VALUES (RATIO=1 OR 0.5) SQUEEZE IMAGE
930 XRATIO=2:YRATIO=1:ZRATIO=1
939 REM READ BARN DATA, OR YOUR OWN DA
TA BY CHANGING DATA LINES FROM 2000 ON
940 FOR I=1 TO LAST
950 READ X,Y,Z
960 X(I)=X*XRATIO:Y(I)=Y*YRATIO:Z(I)=Z
*ZRATIO
969 REM IF X=-999 THEN DON'T MULTIPLY
BY RATIO
970 IF X=-999 THEN X(I)=X:Y(I)=Y:Z(I)=
Z
980 NEXT I
989 REM NOW BACK TO MAIN PROGRAM
990 YAW=0:PITCH=0:ROLL=0:MODE=1:GOTO 5
50
999 REM ATARI LOGO DATA; LAST=278
1000 DATA 278
1009 REM CURVED PARTS OF LOGO (USED 4
TIMES)
1010 DATA -20,-56,-20,-10,-21,-8,-22,2
,-24,4,-24,8,-26,10,-26,12,-28,14,-28,
16,-30,18,-32,20,-34,22
1020 DATA -36,24,-38,26,-40,28,-42,30,
-42,31,-50,34,-54,36,-60,38,-70,40,-70
,56,-62,56,-54,54
1030 DATA -48,52,-44,50,-40,48,-38,46,
-34,44,-32,42,-30,40,-28,38,-26,36,-24
,34,-24,32,-22,30
1040 DATA -20,28,-20,26,-18,24,-18,22,
-16,20,-16,18,-14,16,-13,12,-12,10,-12
,-56,-20,-56,-999,-999
1049 REM STRAIGHT PARTS OF LOGO (USED 2
TIMES)
```

```
1050 DATA -8,-56,-8,56,8,56,8,-56,-8,-56,-999,-999
1059 REM CONNECTING LINES FROM FRONT TO BACK OF LOGO
1060 DATA -20,-56,-70,40,-70,56,-12,-56,-8,-56,-8,56,8,56,8,-56,12,-56,70,56,70,40,20,-56
1069 REM DATA FOR WORD "ATARI"
1070 DATA 21,75,25,65,29,75,28,72,22,72,-999,-999
1080 DATA 31,65,39,65,35,65,35,75,-999,-999
1090 DATA 41,75,45,65,49,75,48,72,42,72,-999,-999
1100 DATA 53,75,53,65,58,65,60,67,60,70,58,72,60,75,58,72,53,72,-999,-999
1110 DATA 64,65,70,65,67,65,67,75,64,75,70,75,-999,-999
1999 REM NAME OF ALTERNATE SHAPE AND NUMBER OF DATA POINTS
2000 DATA BARN,154
2010 DATA -25,21,-15,-25,21,15,-25,-9,15,-25,-9,-15,-25,-17,-9,-25,-21,0,-25,-17,9,-25,-9,15,-999,-999,0,-25,5,-9
2020 DATA -25,5,-5,-25,-1,-5,-25,-1,-9,-25,5,-9,-999,-999,-999,-25,2,-9,-25,2,-5,-999,-999,-999,-25,-1,-7,-25,5,-7
2030 DATA -999,-999,-999,-25,5,5,-25,5,9,-25,-1,9,-25,-1,5,-25,5,5,-999,-999,-999,-25,2,5,-25,2,9,-999,-999,-999
2040 DATA -25,5,7,-25,-1,7,-999,-999,-999,15,-9,-15,15,21,-15,15,21,15,15,-9,15,15,-9,-15,15,-17,-9,15,-21,0
2050 DATA 15,-17,9,15,-9,15,-999,-999,-999,15,5,-9,15,5,-5,15,-1,-5,15,-1,-9,15,5,-9,-999,-999,-999,15,2,-9
2060 DATA 15,2,-5,-999,-999,-999,15,-1,-7,15,5,-7,-999,-999,-999,15,5,5,15,5,9,15,-1,9,15,-1,5,15,5,5
2070 DATA -999,-999,-999,15,2,5,15,2,9,-999,-999,-999,15,5,7,15,-1,7,-999,-999,-999,-25,21,15,15,21,15,15,-9,15
2080 DATA -25,-9,15,-25,21,15,-999,-999,-999,-25,21,-15,15,21,-15,15,-9,-15,-25,-9,-15,-25,21,-15,-999,-999,0,-11
2090 DATA 21,15,1,21,15,1,13,15,-11,13,15,-11,21,15,-5,21,15,-5,13,15,-11,21,15,-11,13,15,-5,21,15,1,13,15
2100 DATA 1,21,15,-5,13,15,-999,-999,-999,-25,-9,-15,15,-9,-15,15,-17,-9,-25,-17,-9,-25,-21,0,15,-21,0,15,-17,9
2110 DATA -25,-17,9,-25,-9,15,15,-9,15,15,-17,9,15,-21,0,15,-17,-9,15,-9,-15,-999,-999,-999,-25,-9,-15,-25,-17,-9
2120 DATA -25,-21,0,-25,-17,9,-25,-9,15,-999,-999,-999,15,21,-12,15,-15,-12,20,-21,-10,15,-15,-8,15,21,-8,18,21,-5
2130 DATA 18,-15,-5,20,-21,-10,22,-15,-5,22,21,-5,25,21,-8,25,-15,-8,20,-21,-10,25,-15,-12,25,21,-12,22,21,-15
2140 DATA 22,-15,-15,20,-21,-10,18,-15,-15,18,21,-15,15,21,-12,15,21,-8,18,21,-5,22,21,-5,25,21,-8,25,21,-12
2150 DATA 22,21,-15,18,21,-15,15,21,-12,-999,-999,0,15,-15,-12,15,-15,-8,18,-15,-5,22,-15,-5,25,-15,-8,25,-15,-12
2160 DATA 22,-15,-15,18,-15,-15,15,-15,-12,-999,-999,-999
```

TYPO TABLE

Variable checksum = 1191245

Line num range		Code	Length
1	- 89	MP	539
90	- 139	TD	548
140	- 200	XL	519
210	- 260	YR	597
269	- 350	NP	527
360	- 459	CH	378
460	- 549	RW	464
550	- 630	ZC	497
640	- 710	QY	401
719	- 790	BC	414
800	- 850	JL	540
860	- 928	ZW	504
929	- 999	HW	504
1000	- 1050	TT	506
1059	- 2010	KD	588
2020	- 2060	SZ	522
2070	- 2110	OO	534
2120	- 2160	PO	482

TYPO TABLE for KEYSTROKE ARTIST

TYPO TABLE

Variable checksum = 3925482

Line num range		Code	Length
10	- 120	GN	377
130	- 220	QB	506
230	- 330	RH	509
340	- 440	LV	518
450	- 520	DT	518
530	- 610	EP	565
620	- 730	CL	354
740	- 830	QY	514
840	- 930	CX	553
940	-1050	AV	405
1060	-1150	FV	554
1160	-1230	LY	505
1240	-1340	FU	547
1350	-1460	ZT	515
1470	-1580	CF	492
1590	-1650	PM	667
1660	-1720	VD	505
1730	-1800	UX	509
1810	-1890	CD	503
1900	-1990	OG	503
2000	-2070	MX	520
2080	-2150	YH	567
2160	-2270	ON	553
2280	-2390	TD	509
2400	-4000	TN	585
4010	-4080	LO	563
4090	-4090	MX	6

Antic COVER ART

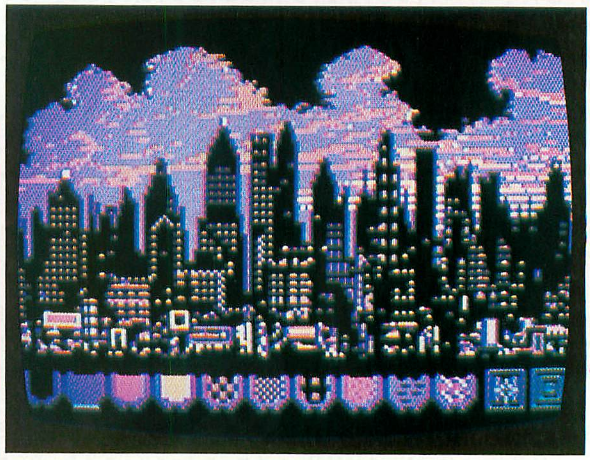


Figure 1
THE WINNER! John Brooks' City of Lights.

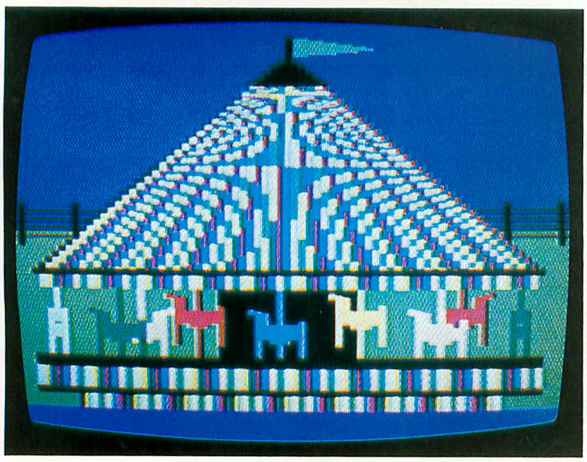


Figure 2
Merry-Go-Round, by Frank Brandle.

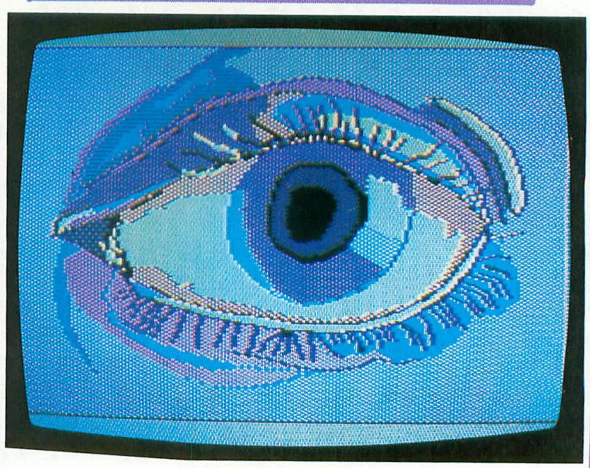


Figure 3
Eye, by Fred Caprilli.

CONTEST WINNERS



Figure 4
S.F. Bay, by Cecilia Gaxiola.

Story on next page . . .



Figure 6
Earth, by Peter Wickman

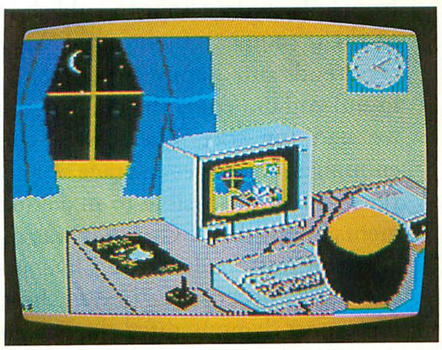


Figure 5
Insomnia, by Richard Slater.

CONTEST WINNERS

The messenger squirmed his way through the crowd that seethed around the entrance of ANTIC. "Hope it's not too late," he murmured, hiding the small package under his khaki jacket. In front of the door burly guards used nightsticks to repel the human tide. The messenger tried to slip unobtrusively between one of the protectors and the wall, until he felt a sudden sharp pain in his ribs.

"Sorry, fella, the contest is closed," the bully said . . .

And closed it is — perhaps not that dramatically, but we were pretty excited about it. At 5:00 p.m. on Wednesday, June 15, we shut the slot and gathered round the monitor to sort and weed and argue, and finally agree on the winners.

"City of Lights," by John Brooks of Indianapolis, Indiana, is the top prize winner of ANTIC's first Cover Art Contest (Figure 1). His entry, executed with **Paint** (Atari), also appears on our cover this month. He receives a $300 cash prize; other winners will receive software.

Second place goes to Frank Brandle, of Aurora, Colorado, for "Merry-Go-Round," (Figure 2). Brandle's piece is remarkable for being done in BASIC using Graphics Mode 10. It was also animated so that the horses seem to revolve; but this attractive feature was disregarded by the judges when comparing "Merry-Go-Round" to other entries.

Canadian Fred Caprilli, of Stoney Creek, Ontario, was our only winner from outside the U.S. His "Eye" (Figure 3) garnered third place. It was done with **Micro-Painter** (DataSoft), and was one of six entries he submitted. About half of our 73 contestants submitted more than one entry, so that a total of 147 entries were considered.

Three more entries were awarded Honorable Mention, and are pictured here. "S.F. Bay" (Figure 4), by Cecilia Gaxiola of San Jose, California, impressed us with its accuracy and texture. Besides, we thought you'd like to see where Atari is located. Too bad she didn't put the ANTIC "A" in the picture, she might have won first prize (just kidding).

Richard Slater, of Hubbard, Ohio, caught the spirit of computing, we thought, with his clever drawing "Insomnia," (Figure 5). His was narrowly the best of several entries depicting the ATARI in use. One such near-winner, Jane Zinke, animated a tiny "monitor" with a dancing chicken, using **BASIC A+** (OSS).

Peter Wickman, from San Francisco, beat the bell by fifteen minutes, delivering his entry by hand on June 15. Called "Earth," (Figure 6), it was done using **Fun With Art** (Epyx). Seven entries arrived after the contest closed. All were looked at, but none were considered as finalists — in fairness to those whose work arrived on time.

One on-time entry was disqualified on a technicality. "Blossoming of Computer Art," by Charles Bennett and Jo Ann Brissenden, was exquisite, but was not "a loadable program." The design was executed on acetate, using **Color Print** (DataSoft). We will be featuring this would-be entry in a special article in a future ANTIC.

Many entries focussed on space travel, and the Space Shuttle in particular. "Moonwalker," by Marty Bates, "Shuttle," by Ryan Savko, and "Challenger," by Thuat Vu, were in strong contention right till the end of the judging. Duane King's "Moon" almost won out as a representative of the few abstract entries.

Names without pictures don't do much good, so we will desist for now. So many good images were submitted that we will continue to show them in upcoming ANTICs, probably in the Microscreens department we began in July. It was delightful to get so many entries; each new package was as exciting as a wrapped gift. We especially thank the youngsters who were outgunned in this competition. We thought it would be impractical to make age a criterion — afterall, who's to check? But we did get many entries that were clearly from kids, and we hope to publish some of them soon.

So ends our happy experiment. We found you did enjoy the challenge, and we had fun too. There were clearly enough good entries to grace our cover, yet it was still possible to make judgements about them. Our bias was probably towards "realism" and fineness of execution, because the best of these efforts most demonstrated the powers of the ATARI. The group of finalist stood out, and disagreement among the judges (whose identities may be surmised) were resolved in favor of the design that promised to look best on the cover.

We hope we made the best choice.

NEXT MONTH IN ANTIC

Education Issue *Atari LOGO*

Intro to Player/Missile Graphics

Type-in Game **HOOKEY** by Dave Plotkin

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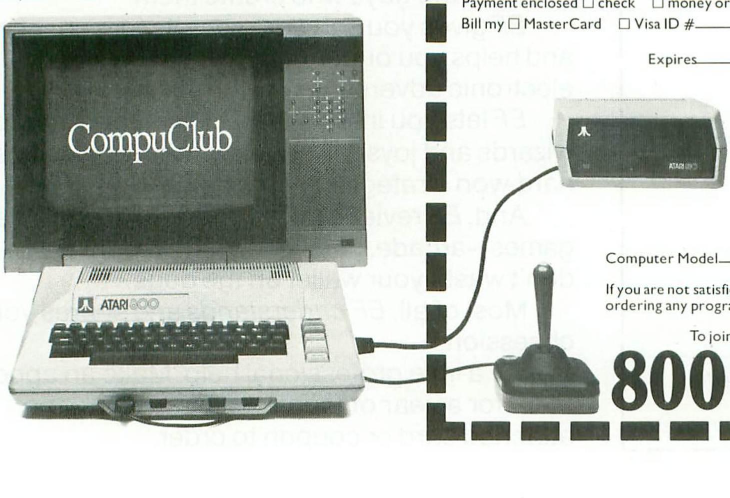
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REDEFINE CHARACTERS

Cursive letters are one possibility

by KATHY and PHIL BERGH

Exciting rumors are leaking fast from silvery silicon gulch. **LOGO** *has been publicly shown and is now scheduled for release in the Fall. Atari has completed designing* **Super PILOT** *and has been using it in its Computer Camps. The specs sound great, four turtles, all visible, all graphic modes — and much, much more! Although Atari hasn't yet decided to release Super PILOT for the general public, we're hopeful.* ANTIC *will run full reviews on both languages as soon as possible.*

ANTIC*'s monthly schedule gives us twice as much space for PILOT. Luckily, we've found a pair of accomplished programmers to share the work of producing creative, useful PILOT programs each month. With this column we welcome Phil and Kathy Bergh as authors. Kathy is a teacher in Washington state. Together, they wrote the only PILOT program yet accepted by APX. I think you'll enjoy their work as much as I do.* —Ken Harms

We have often wished that ATARI had used a traditional division sign instead of the slash for math computations. Perhaps you would like to have animations on the screen with text. Could your program use French accent marks, German umlauts, or even a whole foreign alphabet? Well, PILOT can give you all of these and more, if you design your own customized characters. We will provide you with an overview of character design and show you how to redesign any characters you wish. This article's first program changes the capital "L" to cursive form. The second program creates a steam locomotive in place of six graphics characters and animates it. After these, let your imagination run wild!

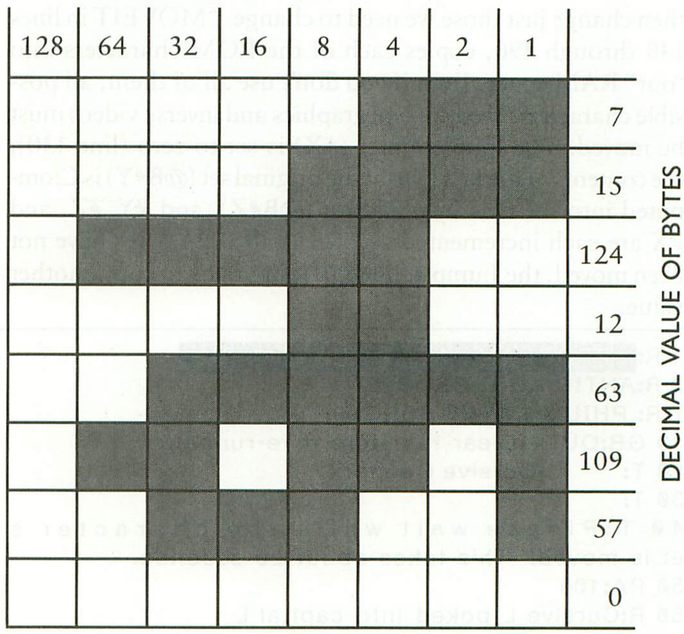
ATARI's character set is in Read Only Memory (ROM) and, as the name implies, you cannot change it. You can, however, copy it into Random Access Memory (RAM), change any characters you like, and tell the computer to use your new set instead of the one in ROM. This article designs and uses characters in Graphics Mode 0 (text mode).

Each character in the set can be visualized as an eight by eight grid of light bulbs, each of which can be either "on" or "off." Each row of the grid is remembered by the computer as one memory byte, so eight bytes are needed to represent the whole grid (one character). The first step in redesigning the set is to color in boxes on small lined graph paper. The colored boxes represent the lighted bulbs. Figure 1 shows our custom letter, a cursive "L" on paper.

The boxes are binary (they are either on or off), but PILOT needs them in decimal notation. The conversion is easy. The numbers across the top of the chart show the decimal value of each column. For the decimal value of each row, add the column values of the filled-in boxes. In the top row, the 4, 2, and 1 column are filled in, so the value of the first byte is 7. Add across each row until you have the value of all rows, These will be the values of the eight bytes making up your custom character.

An even easier way to do this is to use one of the many BASIC utility programs which design characters. They show exactly what the character will look like with screen artifacting and other considerations. Some give the byte value as part of the screen display. Just write the values down.

Figure 1



continued on next page

Next, find the end of the program in the computer's memory so we can put the new character above it. In Program 1, Line 70 C:omputes a value of #Z which is the memory location where the program ends (@word176) divided by the number of bytes in one K (1024) plus three more K. PILOT stores the end of program in RAM space in the two bytes at address 176. We are used to seeing @B for "at byte", but in this case it takes two bytes to remember the end of the program, so the "B" is left out and PILOT gets those two bytes and automatically converts them to a two-byte address.

The Operating System requires that the new character set start at a 1K boundary in memory. The #Z variable will point to a boundary because when we divide by 1024, PILOT ignores the remainder, leaving us at the whole number of a 1K boundary. We then add an arbitrary 3K to insure that we are in clear space. At least 1K must be allowed. Using 3K allows room for program expansion. Line 80 multiplies the K value by 1024 to get the address of the first byte of our custom character set.

This new character set address is saved as #Z, #W, and #A (lines 80, 90 and 100). Variables #Z and #W will be used and incremented while #A will be used to reset values.

PILOT looks at the value stored in byte 756 to find the first memory page of the character set that the computer is going to use. In line 110, the pointer to the ROM character set is multiplied by 256 to convert that page value to a byte address (there are 256 bytes in a page), and it is saved as #Y.

And now the magic line! The C:ompute in line 120 puts the address we selected for the custom character set into address 756. From now on, PILOT will look at our new memory space rather than the ROM characters whenever it needs to display a character. Now it's up to us to give it a new set to display.

Although we could design an entirely new set of 255 characters, it's much easier to copy ATARI's regular set and then change just those we need to change. *MOVEIT in lines 140 through 190, copies each of the ROM characters into "our" RAM space. Even if you don't use all of them, all possible characters (even control graphics and inverse video) must be moved. The loop counter (#X) is set to zero (line 130), the contents of the first byte of the original set (@B#Y) is C:omputed into the new byte address (@B#Z), and #Y, #Z, and #X are each incremented by one. If all 1024 bytes have not been moved, the J:ump at line 190 loops back to copy another value.

Now that the whole set is in RAM, we need to find the character in the set that is to be changed. There is a chart entitled Internal Character Set on page 55 of the ATARI BASIC Reference Manual that shows the order of characters within the ROM character set. Multiplying the value of any character by eight gives the offset of the character into the table, in bytes. Adding this value to the address of the beginning of the new character set (#W) gives the first byte of the character to change (line 200). The Internal Character Set value of capital "L" is 44.

Lines 210 through 350 C:ompute the value we calculated for each row of the cursive "L" in Figure 1 into the spot where "L" was in RAM. The byte address is then incremented, and the next value inserted until all eight values are changed.

Usually, a program would tell the computer to use the new character set after moving the set and inserting the custom characters. We did this in line 120 *before* the set was moved to give an interesting effect of the letters appearing on the screen as they are moved. Once the program is RUN, the new set is in memory, and the "popping letters" effect is lost.

Since PILOT restores the original ROM address to byte 756 after GR:QUIT, LOAD, RESET, and the first WRITE:S in a series, your program must provide a C:ompute @B756 after each occurrence of these commands to remind the computer that we are using a set of our own.

The TRAIN program works just like Program 1 except that the characters [CTRL]—A,S,D,F,G, and H are designed to resemble a train. T:yping and retyping further along on the same line, chugs the train across the screen. Note that before each character is changed, the new address pointer must be reset (line 360, etc.) To see the train move again without re-running the program, enter J:*GO.

After typing in the programs and working out a character of your own, you will begin to see what fun this powerful tool for custom character sets can be. Even better, you don't need to understand it to make it work! To change one character you need only change the Internal Character Set number in line 200 to match the character to be replaced and change the values in lines 210, 230, 250, 270, 290, 310, 330, and 350 to your numbers! You might try making flatcars and boxcars for the train. Other possibilities: Greek, cursive, Japanese and German fonts. Once your imagination is in gear, anything can happen!

We hope you find much fun and many uses for custom character sets.

```
1 R: PROGRAM 1 - CAPITAL L
5 R:ANTIC AUGUST 1983
7 R: PHIL & KATHY BERGH
10 GR:QUIT [Clear registers if re-running
20 T:       Cursive Capital L
30 T:
40 T:Please wait while the character s
et is moved.  This takes about 20 seconds.
50 PA:100
60 R:Cursive L poked into capital L
70 C:#Z=@176/1024+3 [New RAM character
 set pointer K value
80 C:#Z=#Z*1024 [New RAM character set
 pointer byte value
90 C:#W=#Z [Second new character set p
ointer
100 C:#A=#Z [Third new character set p
ointer
110 C:#Y=@B756*256 [Original Character
 set pointer
120 C:@B756=#A/256
130 C:#X=0 [Set loop counter to 0
```

```
140 *MOVEIT
150 C:@B#Z=@B#Y [Copy ROM byte into RAM
160 C:#Y=#Y+1     [Increment ROM and
170 C:#Z=#Z+1     [RAM pointers
180 C:#X=#X+1     [and counter
190 J(#X<1024):*MOVEIT
200 C:#W=#W+(44*8)[OLD ADDRESS+(INTERNAL C
HAR SET #)TIMES 8)
210 C:@B#W=7      [Row 1
220 C:#W=#W+1
230 C:@B#W=15     [Row 2
240 C:#W=#W+1
250 C:@B#W=124    [Row 3
260 C:#W=#W+1
270 C:@B#W=12     [Row 4
280 C:#W=#W+1
290 C:@B#W=63     [Row 5
300 C:#W=#W+1
310 C:@B#W=109    [Row 6
320 C:#W=#W+1
330 C:@B#W=57     [Row 7
340 C:#W=#W+1
350 C:@B#W=0      [Row 8
360 T:
370 T:Sample cursive L's:
380 T:
390 T:Lori  Louise  London  Library
```

```
1 R:       TRAIN
5 R: ANTIC AUGUST 1983
7 R: PHIL & KATHY BERGH
10 GR:QUIT[Clear registers if re-runn
ing
20 T:        ANIMATED TRAIN
30 T:
40 T:Please wait while the character s
et is moved. This takes about 20 seco
nds.
50 PA:100
60 R:Train cars poked intoCTRL A thro
ugh H.
70 C:#Z=@176/1024+3 [New RAM character set p
ointer
80 C:#Z=#Z*1024 [New RAM pointer byte
90 C:#W=#Z[Second new character set p
ointer
100 C:#A=#Z[Third new character set p
ointer.
110 C:#Y=@B756*256 [Original character set pointer
120 C:@B756=#A/256 [Use RAM set
130 C:#X=0 [Set loop counter to 0
140 *MOVEIT [Copy ROM into RAM
150 C:@B#Z=@B#Y
160 C:#Y=#Y+1
170 C:#Z=#Z+1
180 C:#X=#X+1
190 J(#X<1024):*MOVEIT
200 C:#W=#W+((1+64)*8)[OLD ADDRESS+((A
TASCII+OFFSET)TIMES 8) CTRL A
210 C:@B#W=7 [Back of caboose
220 C:#W=#W+1
230 C:@B#W=4
240 C:#W=#W+1
250 C:@B#W=127
260 C:#W=#W+1
270 C:@B#W=73
280 C:#W=#W+1
290 C:@B#W=73
300 C:#W=#W+1
310 C:@B#W=255
320 C:#W=#W+1
330 C:@B#W=56
340 C:#W=#W+1
350 C:@B#W=16
360 C:#W=#A [Reset pointer to beginni
ng of RAM set
370 C:#W=#W+((19+64)*8)[OLD ADDRESS+((
ATASCII+OFFSET)TIMES 8) CTRL S
380 C:@B#W=224 [Front of caboose
390 C:#W=#W+1
400 C:@B#W=32
410 C:#W=#W+1
420 C:@B#W=254
430 C:#W=#W+1
440 C:@B#W=146
450 C:#W=#W+1
460 C:@B#W=146
470 C:#W=#W+1
480 C:@B#W=255
490 C:#W=#W+1
500 C:@B#W=28
510 C:#W=#W+1
520 C:@B#W=8
530 C:#W=#A
540 C:#W=#W+((4+64)*8)[OLD ADDRESS+((A
TASCII+OFFSET)TIMES 8) CTRL D
550 C:@B#W=73 [Back of coal car
560 C:#W=#W+1
570 C:@B#W=0
580 C:#W=#W+1
590 C:@B#W=63
600 C:#W=#W+1
610 C:@B#W=63
620 C:#W=#W+1
630 C:@B#W=63
640 C:#W=#W+1
650 C:@B#W=255
660 C:#W=#W+1
670 C:@B#W=28
680 C:#W=#W+1
690 C:@B#W=8
700 C:#W=#A
710 C:#W=#W+((6+64)*8)[OLD ADDRESS+((A
TASCII+OFFSET)TIMES 8) CTRL F
720 C:@B#W=183 [Front of coal car
730 C:#W=#W+1
740 C:@B#W=0
750 C:#W=#W+1
760 C:@B#W=240
770 C:#W=#W+1
780 C:@B#W=248
```

continued on next page

REDEFINE CHARACTERS *continued*

```
790 C:#W=#W+1
800 C:@B#W=252
810 C:#W=#W+1
820 C:@B#W=255
830 C:#W=#W+1
840 C:@B#W=28
850 C:#W=#W+1
860 C:@B#W=8
870 C:#W=#A
880 C:#W=#W+((7+64)*8)[OLD ADDRESS+((A
TASCII+OFFSET)TIMES 8) CTRL G
890 C:@B#W=119 [Back of engine
900 C:#W=#W+1
910 C:@B#W=0
920 C:#W=#W+1
930 C:@B#W=126
940 C:#W=#W+1
950 C:@B#W=99
960 C:#W=#W+1
970 C:@B#W=127
980 C:#W=#W+1
990 C:@B#W=255
1000 C:#W=#W+1
1010 C:@B#W=28
1020 C:#W=#W+1
1030 C:@B#W=8
1040 C:#W=#A
1050 C:#W=#W+((8+64)*8)[OLD ADDRESS+((
ATASCII+OFFSET)TIMES 8) CTRL H
1060 C:@B#W=192 [Front of engine
```

```
1070 C:#W=#W+1
1080 C:@B#W=48
1090 C:#W=#W+1
1100 C:@B#W=48
1110 C:#W=#W+1
1120 C:@B#W=252
1130 C:#W=#W+1
1140 C:@B#W=252
1150 C:#W=#W+1
1160 C:@B#W=254
1170 C:#W=#W+1
1180 C:@B#W=57
1190 C:#W=#W+1
1200 C:@B#W=16
1210 *GO
1220 POS:2,2
1230 T:◤
1240 POS:14,10
1250 T:All Aboard!
1260 C:#P=2
```

```
1270 C:@B752=1 [Turn cursor off
1280 POS:2,18
1290 T: ▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬▬
     ▬▬▬▬▬ [36 CTRL M's
1300 POS:2,17
1310 T: ▪▪▪▪▪▪▪ [CTRL A through H
1320 PA:60
1330 *MOVETRAIN
1340 SO:0,0,0,0
1350 POS:#P,17
1360 T: ▪▪▪▪▪▪▪ [Space erases last car
1370 PA:5
1380 C:#P=#P+1
1390 J(#P<32):*MOVETRAIN
1400 C:@B752=0 [Turn cursor back on
1410 T:
1420 T:Type J:*GO to see the train ag
ain.
1430 E:
```

Keystroke Artist

Drawing program in Graphics 10

by ALAN GELLINGS

REQUIRES 32K RAM AND GTIA

Those of you who have been waiting for the ultimate drawing program need wait no longer. The Keystroke Artist is here. Now you can create outstanding artwork in nine different colors, with easy-to-use commands and an ordinary joystick.

Before you begin, however, be sure your computer has the GTIA chip. To check this, write the following short program:

```
10 GR. 9
20 GOTO 10
RUN
```

If you get a black screen, you have the GTIA chip. If you get a blue screen, you have the CTIA chip. This program uses Graphics Mode 10, which is not available on the CTIA. Most recently-sold machines have the GTIA, but if you don't, you can get one installed at an authorized service center.

Type in the program and SAVE it on cassette or disk, then follow these simple instructions. In this article you will find many single-letter commands described. Our style is to show keys enclosed in brackets, for example [A] or [SHIFT]. The bracket signifies that the item is a key on the ATARI keyboard. Do not type the brackets themselves.

PROGRAM OPERATION

The Keystroke Artist is full of different commands that make picture creation as easy as possible. It has two main modes of operation: "Draw Mode" and "Travel Mode". When the program begins, you are automatically placed in Draw Mode. Plug a joystick in Port One to move the cursor. In Draw Mode, as the cursor moves it leaves a trail of color. If you press the joystick button while moving, everything in your path will be erased.

In Travel Mode, you can move the cursor anywhere without annihilating anything you've already drawn on the screen. You can toggle between Draw Mode and Travel Mode by pressing the [T] key on the computer keyboard. Another feature of Travel Mode is the ability to draw in your current color by pressing the trigger on the joystick. This makes it possible to move anywhere on the screen and leave a dab of color.

Alan Gellings is studying for a degree in Computer Science at the University of Wisconsin (Oshkosh, by gosh), and is especially interested in the graphics possibilities of the ATARI.



INDIVIDUAL COMMANDS

Whenever you enter a command, you are automatically placed in Draw Mode. If you accidentally enter a wrong command, press [X] and try again.

[C] (Change Current Color)

Press this key to change the current drawing color. When "Change Color To:" appears in the command window, enter a number from one to eight. This changes the drawing color to your choice of the color windows at the top of the screen. The background color cannot be used for drawing.

[N] (New Color)

This is used to change the default screen colors to colors which may look better in your picture. You may choose from 128 different colors. When "New Color For:" appears in the command window, enter a number from zero to eight. Zero is used for background color. To select a new color, push the joystick up or down and press the red trigger button. Colors

can also be chosen by using the keyboard "cursor-up" and "cursor-down" keys, and [RETURN] key takes the place of the joystick button.

[R] (Restore Original Colors)

To restore your colors to the default colors that were present when the program began, (black, red, orange, yellow, green, blue, purple, white and brown), press [R].

[I] (Instant Cursor Position)

1	2	3
4	5	6
7	8	9

There will be times when you want to move the cursor quickly to another part of the screen. Do this with the Instant Position command. The command enables the cursor to instantly move any of nine different positions on the screen. Positions 1 through 9 are laid out in a pattern similar to that of the buttons on a touch-tone phone. To move the cursor to a numbered position, type [I], press the trigger button, and type the number. If you don't press the trigger, a pixel will remain lighted where the cursor started.

[Z] (Draw a Line)

A line connecting two points can be drawn by pressing [Z]. After entering this command, move the cursor to the place where you want to start the line, then press the button to mark this place. Then move the cursor to another location with the joystick. Press the trigger again to connect the two points. If you should ever accidentally get into this command, press the joystick button continuously without moving the cursor to reenter Draw Mode.

[F] (Fill a Space)

This is used for the fill command, which fills any four-sided polygon (must have a horizontal bottom) with a solid color. The background color may not be used, and the polygon must be free of any other color for this command to work properly.

Draw your polygon from the lower-right corner. Move the cursor to the upper-right corner and press the trigger. Next, move to the upper-left corner and again press the button. Finally, fill things in by moving to the lower-left corner and pressing the button. Remember that the last point must be horizontally level with the first.

Entering the [F] command by mistake may be remedied by pressing the trigger button repeatedly until the Draw Mode is reentered.

[D] (Duplicate a Quadrant)

Sections of the screen can be duplicated with the following commands. They are used by numbering the screen into four quadrants (upper left = 1; upper right = 2; lower left = 3; lower right = 4). Note that these areas are marked off on your display. The vertical center is at the middle of each of the two borders immediately above and below the drawing area. Small dots show the horizontal center, and the imaginary lines that connect these locations mark off the different quadrants.

Duplicating any quadrant of the screen to another quadrant is performed using the [D] commands. Enter a number from one to four to specify the quadrant to be duplicated. Then enter a number from one to four to specify the destination.

[M] (Mirror Image)

The [M] command transfers a mirror image of one quadrant into another. It is used like the "Duplicate" command.

[E] (Erase)

Erasing the entire screen or just a small section is possible with the [E] command. If you choose to erase the entire screen, simply enter [A] to specify "All". If you change your mind, enter an [X] to escape. Pressing [P] (partial erase) is an option that should be practiced until you get a feel for the amount of screen you will be erasing. The [P] option provides a choice of a small or a large section. The area erased is to the right of and under the cursor. If you are close to the screen edge, there is no wraparound, and the erased area is proportionally smaller.

[S] (Save Screen)

To save a drawing to disk or tape, simply press [S] and follow the prompts. You are first asked if the storage medium is on disk or tape. Answer with a [D] for disk, or [T] for tape. If you are using tape, press [RETURN] after you hear the two familiar beeps. With disk storage, be sure to use a DOS 2.OS formatted diskette. Filename extenders are not permitted (CAR is okay but CAR.MY is not). Your filename may contain eight letters or numerals as long as the first one is a letter. While the screen is being saved, the screen will change color to signify that an input or output operation is underway.

[L] (Load Screen)

Loading a program is as easy as saving a program. Type in a filename (without a device name) for diskette, or for cassette, press [C], and then any key after the beep.

```
10 REM CREATE -- 1/27/83
20 GOTO 140
30 IF PEEK(20)>5 THEN 50
40 RETURN
50 IF IND=1 THEN IND=0:COLOR C:PLOT X,
Y:GOTO 70
60 IND=1:COLOR 0:PLOT X,Y
70 POKE 20,0:RETURN
80 IF TR THEN COLOR C:IND=0:FLG=1
90 RETURN
100 X=X+XDIR(JOY):Y=Y+YDIR(JOY):IF X<0
 OR X>79 THEN X=X+(X<0)-(X>79)
110 IF Y<3 OR Y>138 THEN Y=Y+(Y<3)-(Y>
138)
120 IF NOT TR THEN IF XDIR(JOY) OR YD
IR(JOY) THEN LOCATE X,Y,Z
130 RETURN
140 POKE 709,15:TRAP 960
150 CLR:DIM CAL$(22),IRPT$(231),XDIR(
```

continued on next page

```
15),YDIR(15),KEY$(65),PLACE$(1),NAME$(
20),MIRROR$(127),ERASE$(71),ARRAY(4)
160 DIM INX(9),INY(9),CIO$(7),MODE$(11
)
170 KEY$="LJ***K**O*PU#I**V*C**BXZ4*36
*521**.N*M**R*EY*TWQ9*07$8**FHD**GSA$"
180 GOSUB 4000
190 CAL=ADR(CAL$)
200 MODE$="DRAW  MODE":TR=0
210 GRAPHICS 9:POKE 559,0:DL=PEEK(560)
+256*PEEK(561):VLU=PEEK(DL+4)+PEEK(DL+
5)*256
220 START=ADR(IRPT$):TENCNGE=START+17:
NINECNGE=TENCNGE+28:CTIA=NINECNGE+47:G
TIA=CTIA+36
230 RETEN=GTIA+47:NINEAGN=RETEN+28
240 ARRAY(1)=VLU+760+80:ARRAY(2)=ARRAY
(1)+20:ARRAY(3)=ARRAY(1)+2720:ARRAY(4)
=ARRAY(3)+20
250 FOR I=1 TO 9:READ J,K:INX(I)=J:INY
(I)=K:NEXT I
260 DATA 0,3,40,3,79,3,0,71,40,71,79,7
1,0,138,40,138,79,138
270 D=USR(CAL,1769,1770,TENCNGE)
280 D=USR(CAL,1771,1772,NINECNGE)
290 D=USR(CAL,1773,1774,CTIA)
300 D=USR(CAL,1775,1776,GTIA)
310 D=USR(CAL,1777,1778,RETEN)
320 D=USR(CAL,1779,1780,NINEAGN)
330 D=USR(CAL,512,513,TENCNGE):REM INI
TIALIZE INTERRUPT POINTER
340 D=USR(CAL,DL+106,DL+107,VLU+3760)
350 POKE DL+99,15:POKE DL+100,15:POKE
DL+101,15:REM CLEAR OUT OLD LMS
360 POKE DL+3,15+64+128
370 POKE DL+21,15+128
380 POKE DL+23,0:POKE DL+24,0+128
390 FOR I=25 TO 28:POKE DL+I,6:NEXT I
400 POKE DL+29,0+128:POKE DL+30,0
410 POKE DL+31,15+128
420 POKE DL+105,15+64
430 POKE DL+169,15+128
440 POKE DL+171,65:POKE DL+172,PEEK(56
0):POKE DL+173,PEEK(561):POKE 559,34
450 J=0:FOR I=0 TO 79:J=J+1:IF J>15 TH
EN J=0
460 COLOR J:PLOT I,0:PLOT I,17:PLOT I,
20:PLOT I,157:NEXT I
470 D=USR(ADR(MIRROR$),1,0,68,ARRAY(3)
,ARRAY(4)):D=USR(ADR(MIRROR$),0,1,68,A
RRAY(4),ARRAY(2)+2680)
480 COLOR 1:PLOT 40,20:PLOT 39,20:PLOT
 40,157:PLOT 39,157
490 POKE 1764,120:POKE 1765,8:POKE 176
6,103:POKE 1768,224
500 D=USR(START)
510 GOSUB 1300
520 C=-1:FOR I=1 TO 16:C=C+1:IF C>8 TH
EN C=0
530 COLOR C:PLOT 0,I:DRAWTO 4,I:NEXT I
540 C=9:J=-3
550 J=J+8:C=C-1:IF C=-1 THEN 570
560 K=J+7:FOR I=1 TO 16:COLOR C:PLOT J
,I:DRAWTO K,I:NEXT I:GOTO 550
570 D=USR(CAL,88,89,VLU+720)
580 POSITION 0,0:POKE 87,1:? #6;"  8 7
 6 5 4 3 2 1B "
590 FOR I=1 TO 15:READ D:XDIR(I)=D:REA
D D:YDIR(I)=D:NEXT I
600 DATA 0,0,0,0,0,0,0,0,1,1,1,-1,1,0,
0,0,-1,1,-1,-1,-1,0,0,0,0,1,0,-1,0,0
610 POSITION 2,2:C=5:X=40:Y=71:GOSUB 9
70:COLOR 3:PLOT 0,70:PLOT 0,71:PLOT 79
,70:PLOT 79,71
620 IND=0
630 GOSUB 30:KEY=PEEK(764):IF KEY<>255
 THEN COLOR 0:PLOT X,Y:GOSUB 750:GOSUB
 930:GOSUB 970
640 IF MRK THEN MRK=0:LOCATE X,Y,Z
650 JOY=STICK(0)
660 IF STRIG(0)=0 THEN IND=1:COLOR 0:G
OSUB 80:GOSUB 700:GOTO 630
670 GOSUB 680:GOTO 630
680 FLG=0:IF JOY<>15 THEN COLOR C
690 IF TR THEN IF XDIR(JOY) OR YDIR(JO
Y) THEN COLOR Z:FLG=1
700 PLOT X,Y
710 GOSUB 100
720 IF FLG THEN LOCATE X,Y,Z
730 RETURN
740 GOTO 630
750 POKE 87,1:GOSUB 930:IF KEY>63 THEN
 920
760 GOSUB 940
770 POKE 764,255:IF TR THEN GOSUB 2440
:IF PLACE$<>"■" THEN 750
780 IF PLACE$="C" THEN SA=29:SB=35:SC=
60:GOSUB 1630:GOTO 1060
790 IF PLACE$="S" THEN SA=29:SB=40:SC=
60:GOSUB 1630:GOTO 1120
800 IF PLACE$="M" THEN SA=29:SB=47:SC=
60:GOSUB 1630:GOTO 1470
810 REM Routine to load main menu will
 be added here.
820 IF PLACE$="D" THEN SA=40:SB=47:SC=
60:GOSUB 1630:GOTO 1550
830 IF PLACE$="I" THEN SA=35:SB=53:SC=
60:GOSUB 1630:GOTO 2290
840 IF PLACE$="L" THEN SA=35:SB=40:SC=
60:GOSUB 1630:GOSUB 2460:GOTO 1660
850 IF PLACE$="F" THEN SA=29:SB=40:SC=
47:GOSUB 1630:GOTO 2210
860 IF PLACE$="N" THEN SA=40:SB=60:SC=
81:GOSUB 1630:GOTO 1780
870 IF PLACE$="Z" THEN SA=29:SB=35:SC=
45:GOSUB 1630:GOTO 2140
880 IF PLACE$="R" THEN SA=35:SB=45:SC=
60:GOSUB 1630:GOTO 1880
890 IF PLACE$="E" THEN SA=35:SB=53:SC=
60:GOSUB 1630:GOTO 1960
900 IF PLACE$="■" THEN PLACE$=" ":RETU
RN
910 IF PLACE$="T" THEN 2440
920 GOSUB 980:RETURN
930 TRAP 40000:POSITION 2,2:? #6;"
              ":POSITION 2,2:RETURN
940 IF KEY>64 THEN PLACE$="*":RETURN
950 PLACE$=KEY$(KEY+1,KEY+1):RETURN
```

```
960 GOTO 140
970 ? #6;MODE$:POKE 87,10:POKE 764,255
:POKE 16,64:POKE 53774,64:RETURN
980 ? #6;"INVALID ENTRY":GOSUB 1590:RE
TURN
990 IF PEEK(764)=255 THEN 990
1000 RETURN
1010 FOR K=1 TO 100:NEXT K:RETURN
1020 COLOR C:PLOT X,Y:IF X1>-1 THEN PL
OT X1,Y1
1030 FOR I=1 TO 3:NEXT I:COLOR 0:PLOT
X,Y:IF X1>1 THEN PLOT X1,Y1
1040 IF X2>-1 THEN COLOR C:PLOT X1,Y1:
DRAWTO X2,Y2
1050 RETURN
1060 GOSUB 930:? #6;"CHANGE COLOR "
;:POKE 764,255:GOSUB 990:KEY=PEEK(764)
1070 GOSUB 940:GOSUB 1320:IF ASC(PLACE
$)<49 OR ASC(PLACE$)>56 THEN GOSUB 173
0:GOSUB 930:GOSUB 980:GOTO 1060
1080 GOSUB 1730:C=VAL(PLACE$):RETURN
1090 COLOR C:PLOT X,Y:FOR I=1 TO 8:NEX
T I:COLOR 0:PLOT X,Y:RETURN
1100 GOSUB 1090:IF PEEK(764)=255 THEN
FOR I=1 TO 6:NEXT I:GOTO 1100
1110 RETURN
1120 POKE 87,10:COLOR C:PLOT X,Y:POKE
87,2:GOSUB 1580:GOSUB 1320
1130 IF PLACE$="D" THEN 1170
1140 IF PLACE$<>"T" THEN GOSUB 1730:GO
SUB 930:GOSUB 980:GOTO 1120
1150 GOSUB 1730:GOSUB 930:TRAP 1160:?
#6;"SAVING ON TAPE":POKE 764,255:LPRIN
T
1160 TRAP 1900:NAME$="C:":POKE 54286,6
4:OPEN #1,8,128,NAME$:GOTO 1190
1170 GOSUB 1730:GOSUB 1370
1180 POKE 54286,64:GOSUB 930:? #6;"SAV
ING ON DISK":GOSUB 1010:TRAP 1900:OPEN
 #1,8,0,NAME$
1190 CMD=11:STADR=704:BYTES=9:IOCB=1:G
OSUB 2330:STADR=VLU+840:BYTES=5440:GOS
UB 2330
1200 CLOSE #1:GOSUB 1890
1210 RETURN
1220 GOSUB 930:? #6;"1ST QUADRANT:";:P
OKE 764,255:GOSUB 990:KEY=PEEK(764):GO
SUB 940:GOSUB 1340:TRAP 1280
1230 I=VAL(PLACE$):IF I>4 OR I<1 THEN
GOSUB 1460:GOTO 1220
1240 GOSUB 1730
1250 GOSUB 930:? #6;"2ND QUADRANT:";:P
OKE 764,255:GOSUB 990:KEY=PEEK(764):GO
SUB 940:GOSUB 1340:TRAP 1290
1260 J=VAL(PLACE$):IF J<1 OR J>4 THEN
GOSUB 1460:GOTO 1250
1270 GOSUB 1730:RETURN
1280 GOSUB 1460:GOTO 1220
1290 GOSUB 1460:GOTO 1250
1300 POKE 705,68:POKE 706,246:POKE 707
,218:POKE 708,182:POKE 709,134:POKE 71
0,100:POKE 711,14:POKE 712,224
1310 POKE 704,0:RETURN
1320 IF PLACE$="X" THEN GOSUB 1730:GOS
UB 930:? #6;"EXIT":GOSUB 1650:POP
1330 RETURN
1340 IF PLACE$="X" THEN GOSUB 1730:GOS
UB 930:? #6;"EXIT":GOSUB 1650:POP :POP
1350 RETURN
1360 PLOT PEEK(709)-21,7
1370 NAME$="D:        ":J=2:GOSUB 930:
POKE 764,255:? #6;"FILENAME: --------"
1380 POSITION 11,2:FOR I=1 TO 9:REM IN
PUT LOOP
1390 POKE 764,255:GOSUB 990:KEY=PEEK(7
64):SOUND 0,10,0,7:GOSUB 940
1400 J=J+1:SOUND 0,0,0,0:IF PLACE$ = "#"
 THEN 1450
1410 IF PLACE$="$" OR J>10 THEN 1370
1420 IF PLACE$="*" THEN J=J-1:GOTO 139
0
1430 NAME$(J,J)=PLACE$
1440 ? #6;PLACE$;:NEXT I
1450 RETURN
1460 NTE=200:GOSUB 1730:GOSUB 930:? #6
;"1-4 ONLY":GOSUB 1590:RETURN
1470 GOSUB 1220
1480 VER=0:HOR=0:IF I<3 AND J>2 THEN V
ER=1
1490 IF I>2 AND J<3 THEN VER=1
1500 IF (I=2 OR I=4) AND (J=1 OR J=3)
THEN HOR=1
1510 IF (I=1 OR I=3) AND (J=2 OR J=4)
THEN HOR=1
1520 I=ARRAY(I):J=ARRAY(J):IF VER=1 TH
EN J=J+2680
1530 D=USR(ADR(MIRROR$),HOR,VER,67,I,J
)
1540 RETURN
1550 GOSUB 1220
1560 D=USR(ADR(MIRROR$),0,0,67,ARRAY(I
),ARRAY(J))
1570 RETURN
1580 GOSUB 930:POKE 764,255:? #6;"DISK
 OR TAPE:";:GOSUB 990:KEY=PEEK(764):GO
SUB 940:GOSUB 1340:RETURN
1590 GOSUB 1620
1600 FOR T=1 TO 40:SOUND 0,16,10,14:SO
UND 0,0,0,0:FOR U=1 TO 1:NEXT U:NEXT T
:FOR T=1 TO 20:NEXT T:RETURN
1610 FOR T=14 TO 0 STEP -2:SOUND 0,81,
10,T:NEXT T:RETURN
1620 FOR T=14 TO 0 STEP -2:SOUND 0,200
,10,T:NEXT T:RETURN
1630 SOUND 0,SA,10,8:GOSUB 1640:SOUND
0,SB,10,8:GOSUB 1640:SOUND 0,SC,10,8:G
OSUB 1640:SOUND 0,0,0,0:RETURN
1640 FOR K=1 TO 10:NEXT K:RETURN
1650 FOR U=1 TO 8:SOUND 0,29,10,8:SOUN
D 1,35,10,8:FOR T=1 TO 5:NEXT T:SOUND
0,0,0,0:SOUND 1,0,0,0:NEXT U:RETURN
1660 GOSUB 1580:IF PLACE$="D" THEN 170
0
1670 IF PLACE$<>"T" THEN GOSUB 1730:GO
SUB 930:GOSUB 980:GOTO 1660
1680 TRAP 1690:LPRINT
1690 TRAP 40000:GOSUB 930:TRAP 1740:?
```

continued on next page

```
#6;"LOADING FROM TAPE":POKE 764,255:PO
KE 54286,64:OPEN #1,4,128,"C:":GOTO 17
10
1700 GOSUB 1730:GOSUB 1370:POKE 54286,
64:GOSUB 930:TRAP 1740:? #6;"LOADING F
ROM DISK":GOSUB 1010:OPEN #1,4,0,NAME$
1710 CMD=7:STADR=704:BYTES=9:IOCB=1:GO
SUB 2330:STADR=VLU+840:BYTES=5440:GOSU
B 2330
1720 MRK=1:CLOSE #1:GOSUB 1890:RETURN
1730 ? #6;PLACE$:GOSUB 1610:GOSUB 1010
:RETURN
1740 CLOSE #1:GOSUB 1890:GOSUB 930:? #
6;"INPUT ERROR":GOSUB 1010:GOSUB 930:?
 #6;"TRY AGAIN?";:POKE 764,255
1750 GOSUB 990:KEY=PEEK(764)
1760 GOSUB 940:GOSUB 1730:GOSUB 1320:I
F PLACE$="Y" THEN GOSUB 930:GOTO 1660
1770 RETURN
1780 VOL=2:GOSUB 930:? #6;"NEW COLOR F
OR:";:POKE 764,255:GOSUB 990:KEY=PEEK(
764):GOSUB 940:GOSUB 1320
1790 GOSUB 1730:IF ASC(PLACE$)<48 OR A
SC(PLACE$)>56 THEN GOSUB 930:GOSUB 980
:GOTO 1780
1800 LOC=VAL(PLACE$)+704:CURCOL=PEEK(L
OC):GOSUB 930:? #6;"CHANGE COLOR"
1810 I=PEEK(764):J=STICK(0):IF I=14 OR
 I=142 OR J=14 THEN CURCOL=CURCOL+2:PO
KE 764,255:SOUND 0,10,0,7
1820 IF I=15 OR I=143 OR J=13 THEN CUR
COL=CURCOL-2:POKE 764,255:SOUND 0,10,0
,7
1830 IF I=12 OR STRIG(0)=0 THEN 1870
1840 IF CURCOL>255 THEN CURCOL=0
1850 IF CURCOL<0 THEN CURCOL=255
1860 SOUND 0,0,0,0:POKE LOC,CURCOL:GOT
O 1810
1870 GOSUB 1610:RETURN
1880 GOSUB 930:? #6;"RESTORE COLORS":G
OSUB 1010:GOSUB 1300:RETURN
1890 D=USR(CAL,512,513,TENCNGE):D=USR(
START):RETURN
1900 TRAP 40000:TRAP 1950
1910 CLOSE #1:GOSUB 1890:GOSUB 930:ERR=
PEEK(195):IF ERR=162 THEN ? #6;"DISK
FULL":GOTO 1940
1920 IF ERR=167 THEN ? #6;"FILE LOCKED
":GOTO 1940
1930 ? #6;"OUTPUT ERROR"
1940 GOSUB 1010:GOSUB 930:GOSUB 1010:R
ETURN
1950 TRAP 40000:TRAP 1910:LPRINT:GOTO
 1910
1960 GOSUB 930:? #6;"ALL OR PARTIAL:";
:POKE 764,255:GOSUB 990:KEY=PEEK(764):
GOSUB 940:GOSUB 1320
1970 GOSUB 1730:IF PLACE$="P" THEN 200
0
1980 IF PLACE$<>"A" THEN GOSUB 930:GOS
UB 980:GOTO 1960
1990 D=USR(ADR(ERASE$),40,136,0,VLU+84
0):GOTO 2100
2000 GOSUB 930:? #6;"SMALL OR LARGE:";
:POKE 764,255:POKE 87,10:GOSUB 1100:KE
Y=PEEK(764):GOSUB 940
2010 POKE 87,1:POSITION 17,2:GOSUB 173
0:GOSUB 1320
2020 IF PLACE$="S" THEN HOR=5:VER=10:G
OTO 2050
2030 IF PLACE$<>"L" THEN GOSUB 930:GOS
UB 980:GOTO 2000
2040 HOR=10:VER=20
2050 I=80-X:J=139-Y:IF J<VER THEN VER=
J
2060 ODD=0:IF INT(X/2)<>X/2 THEN ODD=1
2070 IF I/2<HOR THEN HOR=INT(I / 2 ) : I F I
NT(I/2)<>I/2 THEN COLOR 0:POKE 87,10:P
LOT 79,Y:DRAWTO 79,Y+VER-1:POKE 87,1
2080 IF X>76 THEN POKE 87,10:COLOR 0:F
OR T=X TO 79:PLOT T,Y:DRAWTO T,Y+VER:N
EXT T:POKE 87,2:GOTO 2100
2090 D=USR(ADR(ERASE$),HOR,VER,ODD,VLU
+840+((Y-3)*40)+INT(X/2))
2100 RETURN
2110 GOSUB 930:? #6;"PRESS Y TO QUIT:"
;:POKE 764,255:GOSUB 990:KEY=PEEK(764)
:GOSUB 940:GOSUB 1320:GOSUB 1730
2120 TRAP 2400:IF PLACE$="Y" THEN GRAP
HICS 17:POSITION 0,10:PRINT #6;" loadi
ng main menu":RUN "D:MENU"
2130 RETURN
2140 GOSUB 930:? #6;"ENTER 1ST POINT":
X1=-1:X2=-1:POKE 87,10
2150 JOY=STICK(0):GOSUB 100:GOSUB 1020
:IF STRIG(0)=0 THEN X1=X:Y1=Y:GOSUB 16
40:GOTO 2170
2160 GOTO 2150
2170 POKE 87,1:GOSUB 930:? #6;"ENTER N
EXT POINT":POKE 87,10
2180 JOY=STICK(0):GOSUB 100:GOSUB 1020
:IF STRIG(0)=0 THEN X2=X:Y2=Y:GOSUB 10
20:POKE 87,1:GOTO 2200
2190 GOTO 2180
2200 GOSUB 1640:RETURN
2210 GOSUB 2140:POKE 87,10:X1=X:Y1=Y:G
OSUB 2170
2220 GOSUB 930:? #6;"ENTER LAST POINT"
:POKE 87,10
2230 JOY=STICK(0):GOSUB 100:COLOR C:PL
OT X,Y:PLOT X2,Y2:FOR I=1 TO 3:NEXT I
2240 IF STRIG(0)=0 THEN 2270
2250 COLOR 0:PLOT X,Y:PLOT X2,Y2
2260 GOTO 2230
2270 TRAP 2280:POSITION X,Y:POKE 765,C
:XIO 18,#6,0,0,"S:"
2280 PLOT X,Y:DRAWTO X,Y:POKE 87,1:RET
URN
2290 GOSUB 930:? #6;"INSTANT POSITION:
";:POKE 764,255:GOSUB 990:KEY=PEEK(764
):GOSUB 940:GOSUB 1320:GOSUB 1730
2300 IF ASC(PLACE$)<49 OR ASC(PLACE$)>
57 THEN GOSUB 930:GOSUB 980:GOTO 2290
2310 IF STRIG(0)<>0 THEN POKE 87,10:CO
LOR C:PLOT X,Y:POKE 87,2
2320 X=INX(VAL(PLACE$)):Y=INY(VAL(PLAC
E$)):RETURN
2330 IOCBX=IOCB*16:ICCOM=834+IOCBX: I C S
```

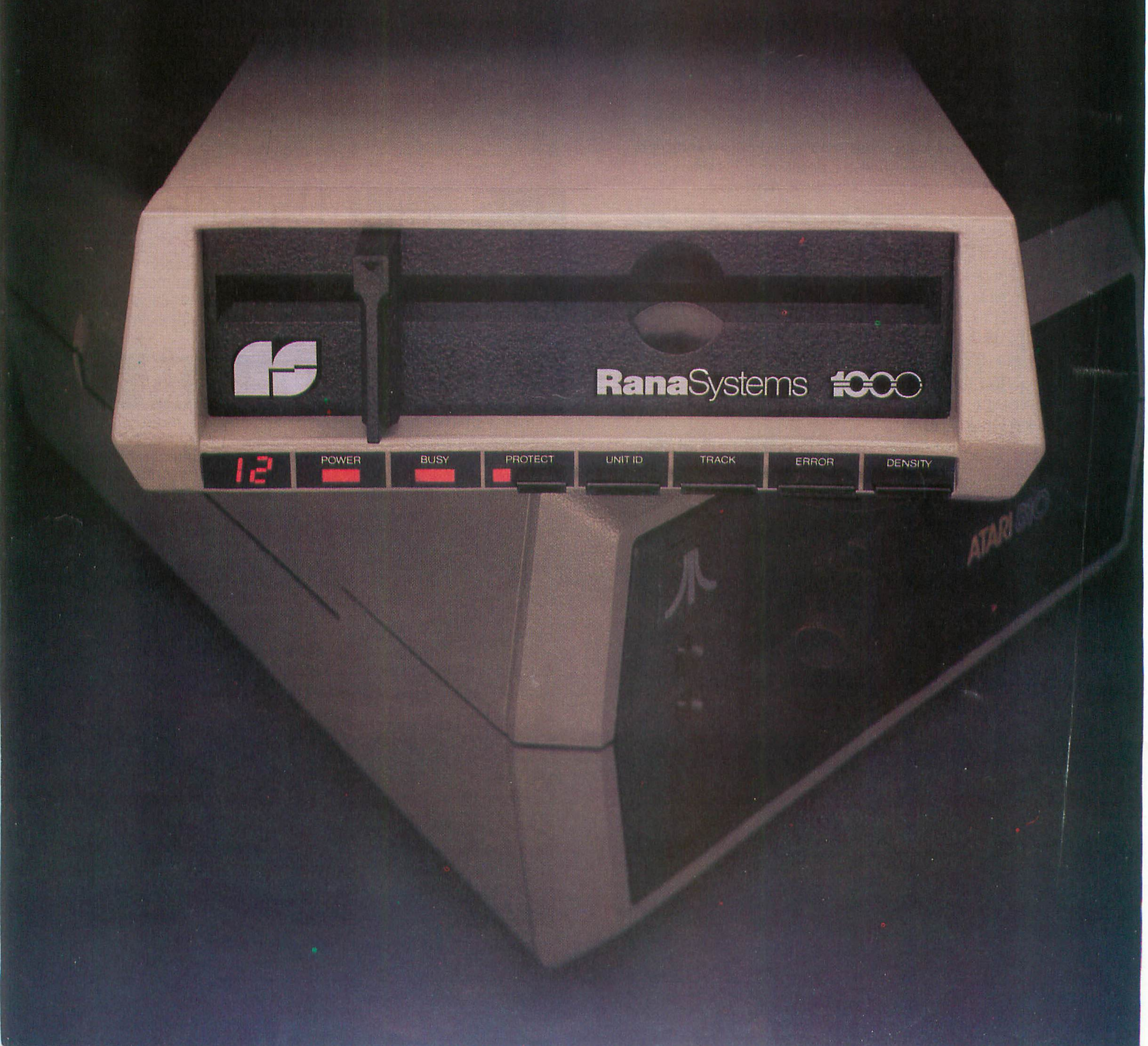
```
TA=835+IOCBX:ICBAL=836+IOCBX:ICBAH=837
+IOCBX
2340 ICBLL=840+IOCBX:ICBLH=841+IOCBX
2350 D=USR(CAL,ICBAL,ICBAH,STADR)
2360 D=USR(CAL,ICBLL,ICBLH,BYTES)
2370 POKE ICCOM,CMD:D=USR(ADR(CIO$),IO
CBX)
2380 ERR=PEEK(ICSTA):RETURN
2390 REM WRONG DISK
2400 PRINT "[illegible]***Error***"
2410 POKE 764,255:TRAP 40000:PRINT "[illegible]     I
nsert The Window Showcase d i s k  a n d  p
ress RETURN to load the main menu."
2420 IF PEEK(764)<>12 THEN 2420
2430 GOTO 2120
2440 FOR T=14 TO 0 STEP -1:SOUND 0,29,
10,T:SOUND 1,35,10,T:SOUND 2,60,10,T:N
EXT T
2450 IF TR THEN MODE$="DRAW  MODE":TR=0
:GOTO 2470
2460 IF  NOT TR THEN MODE$="TRAVEL  MOD
E":TR=1:IF PLACE$<>"L" THEN POKE 87,10
:COLOR C:PLOT X,Y:POKE 87,1
2470 IF PLACE$="T" THEN PLACE$="[illegible]"
2480 RETURN
```

NOTE: The following program lines do not conform to a standard 38-column screen format because of typesetting bugs which are being worked out. All characters are present, however.

```
4000 IRPT$(1,100)="h[illegible])@py[illegible]H
[illegible])@[illegible]k[illegible]h@H[illegible]H
[illegible]@[illegible]dEO%N[illegible]PJ[illegible]s[illegible]m
[illegible]n[illegible]h[illegible]h@H[illegible]P[illegible])"
4010 IRPT$(101,200)="?[illegible]P[illegible]h[illegible]EO%N[illegible]P[illegible]o
[illegible]p[illegible]h@H[illegible]H[illegible]P[illegible])[illegible]@[illegible]P[illegible]
D[illegible]EO%N[illegible]PJ[illegible]s[illegible]q[illegible]r[illegible]h[illegible]h@H[illegible]
P[illegible])@[illegible]P[illegible]s[illegible]t[illegible]"
4020 IRPT$(201,231)="[illegible]h@H[illegible]P[illegible])[illegible]@[illegible]P
[illegible]i[illegible]j[illegible]h@"
4030 MIRROR$(1,100)="hhh[illegible]Vhh[illegible]Whh[illegible]Xh[illegible]]h
[illegible]\h[illegible]h[illegible]^[illegible])[illegible]Y%Vp 1\[illegible]Z[illegible]****[illegible]*)[illegible][
[illegible])p[illegible]e[$Y[illegible]^[illegible]Y$Z[illegible]0[illegible]1\[illegible]^[illegible]y%Wp[illegible]8%^i(
^%[illegible]j[illegible]%^i"
4040 MIRROR$(101,127)="([illegible]^%[illegible]i[illegible]%\i(
[illegible]\%]i[illegible]]FX[illegible]"
4050 ERASE$="hhh[illegible]Vhh[illegible]Whh[illegible]Xh[illegible]Zh[illegible]Y)[illegible]$V
[illegible]&Xp[illegible]H1Y)[illegible]Y)[illegible]Y[illegible]P[illegible]%Xp[illegible]1Y)p[illegible]Y
[illegible]%Yi([illegible]Y%Zi[illegible]ZFWPM[illegible]"
4060 CAL$="hh[illegible]Wh[illegible]Vh[illegible]Yh[illegible]X[illegible]h[illegible]Xh[illegible]V[illegible]"
4070 CIO$="hhh[illegible]LVd"
4080 MIRROR$(35,35)=CHR$(34):MIRROR$(1
26,126)=CHR$(155)
4090 RETURN
```

see page 31 for **TYPO TABLE**

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Picture Utility

Move your Micropainter masterpiece

by WILLIAM HOUGH

My daughter, Kathy, is quite an artist. She enjoys using **MICROPAINTER** as a sketch pad. However, the sketches often end up in places on the screen that don't quite meet the rules of good artistic composition (see Fig. 1). Consequently, few of her sketches developed in masterpieces.

I tried to get her to do some prior planning, but wasn't successful (maybe because she's twelve, or maybe because I'm her dad). So, I decided to write a utility that would relocate her picture to a different place on the screen. Like many utilities, it kept growing. PICUTE, standing for PICture UTility, is currently capable of repositioning and cropping a picture stored on disk in the MICROPAINTER format, and adding bold text or graphics characters of several different sizes and colors anywhere on the screen without disturbing the background picture (see Fig. 2). If you don't have a MICROPAINTER, you can still use PICUTE to make patterned screens in several colors and superimpose text or ATARI graphics characters on them. PICUTE is a fairly complicated program, so you should read these instructions carefully before using it. In a typical session with PICUTE, you might follow these procedures:

Bill Hough is an engineer with degrees from Northwestern and Stanford, and has been with the Bell System for 17 years. Mastering the ATARI is a principal leisure-time activity. He is the author of a logical game called "Brainboggler," available through Educational Software, Inc., and is working on a program to analyze stock option strategies with the ATARI.

First, you load a MICROPAINTER screen you've created. Perhaps the subject is slightly off-center, or you may wish to add text without having to draw the letters. Before loading the specified file, PICUTE will ask you if you want to move the picture. Type YES, and specify a horizontal offset of 0 and a vertical offset of –192. This loads the picture immediately below the visible screen memory, where it remains intact until you load or move another picture to that area. You may now move the picture up into the visible screen by pressing SELECT, then M (for Move), and then specifying a vertical offset of 192. This is a copy of the below-screen area and serves as your working copy. The below-screen master copy may be called up repeatedly at machine speed by using SELECT and M.

When PICUTE begins, you find instructions for program functions. Since prompts could not be printed on the screen at the same time as your pictures, it was necessary to sound a tone as a prompt. If you don't want to load a screen, choose the option to create a blank screen. The screen will turn off for 15 seconds to initialize, then you will be prompted for





colors. I have used the same convention as MICROPAINTER for Color commands. This chart should make things clear:

MICROPAINTER PAINT POT	BASIC SPECIFICATION COMMAND	BASIC SELECTION COMMAND	RAM SHADOW LOCATION
1	SETCOLOR 4	COLOR 0	712
2	SETCOLOR 0	COLOR 1	708
3	SETCOLOR 1	COLOR 2	709
4	SETCOLOR 2	COLOR 3	710

At this point, you will probably want to press SELECT in order to write text, draw with graphics characters, or add borders. When you want to save it, press START.

When loading an existing file, do not type the "D:" prefix. As mentioned, you will be asked if you want to move the picture. The screen is 40 bytes wide, so a horizontal displacement of 20 or −20 will move the picture halfway across the screen. The picture always wraps around. You will also be asked for vertical displacement. A positive value will move the picture down the screen one scan line per unit, and negative will move it up. If the picture doesn't display exactly where you want it, the internal move routine will let you achieve the exact placement you want.

If, after a picture is displayed, you press SELECT, you will return to a menu of four choices. Type the highlighted letter to use the appropriate routine.

ADD TEXT — T

You can place up to 20 characters of text per line on the screen with this option. Any characters may be used, including inverse video and graphics. Use the DELETE and INSERT keys to position and edit your text. Text may be of five standard heights, from eight scan lines to 40 scan lines high. The vertical position is measured in scan lines from the top of the picture. PICUTE won't let you print off the screen.

When asked to select color, use the MICROPAINTER "paint pot" numbers 1 through 4. If you do not see your text after it has been placed, it is probably the same color as the background. With experimentation, you will find that this is an extremely versatile routine.

ADD BORDERS — B

The crop routine lets you add a border of any width to any edge. A striped pattern is obtained by answering "M" (for mixed) when prompted for the color, and then specifying a number which determines the colors of the stripes. The number must be the decimal value of an eight-bit binary byte, and therefore can range from zero (00000000 in binary) to 255 (11111111 in binary). The specific pattern of bits in the byte determines which colors will be used in which order.

For instance, the number 27 (decimal) is represented in binary as 00-01-10-11 (hyphens inserted to show pairs of bits).

MICROPAINTER has four paint pots, each of which contain any of the possible ATARI colors, but only one color per pot at a time — ergo, a four-color screen. The bit-pair 00 designates Pot 1, 01 equals Pot 2, 10 equals Pot 3, and 11 equals Pot 4. If we specify decimal 27, we get a striped border with Pots 1, 2, 3, and 4 in that order.

A byte of 228 (decimal), or 11-10-01-00, will give the same four colors in reverse order. If you want wider stripes in two colors, you could pick 01-01-10-10, or 90 decimal.

You can make a striped blank picture by specifying a byte and overwriting the entire screen.

MOVE PICTURE — M

This internal move is something like a scroll. You can use the RAM area immediately below the screen memory much as you would disk storage. If you don't like a change you've made, you can bring the original back by moving the picture up with a vertical offset of +192. If you make a change that you like, "store" it with a vertical offset of −192, then bring it back with a +192, and continue creating. A picture stored in lower memory can be recalled repeatedly without affecting the stored image.

Moving an image horizontally causes it to wrap around. If you invoke this feature while you have a picture stored in lower memory, it will produce a one-scan-line vertical step in the hidden image. Therefore, you should do horizontal moves before storing an image below screen memory.

CHANGE COLORS — C

This routine is straightforward. You can change any or all colors. Use Table 9.3 of your BASIC manual to select color and luminance in the SETCOLOR format.

SAVING A PICTURE — START BUTTON

When you want to store a picture on disk, press the START button. You will be asked for a filename. Don't use the "D:" prefix. The current colors will be appended to the picture file. In case of errors during a write, a TRAP will occur and you will be given another chance to save the picture. Thus there is little chance of losing the picture.

FINAL POINTS

The BREAK key has been left functional deliberately. Once the program is underway, you can press BREAK at any time, except when the picture is actually changing. Some interesting patterns can be generated by typing direct statements in BASIC. Screen memory starts at location "SM" and there are 7680 bytes in a screen. Try, for example, the direct statement:

```
FOR I=SM TO SM+7640 STEP 40: FOR K=0 TO 39:
POKE I+K,(I-SM)/40+20: NEXT K: NEXT I
```

This will take some time to execute. When the READY prompt appears, type GOTO PIC. There should be a woven rug pattern on the screen upon which you can write text. Try using inverse video characters. The statement GOTO PIC will recover from any possible input errors the program fails to trap.

Three of the relocatable machine language routines, MOVEP$, MOVEN$, and VCOR$, are adaptations of Bob Stewart's MOVE program contained in his article "Supercharging BASIC," in the April, 1983 issue of ANTIC. His single program does not allow the move-from area to overlap the move-to area. These routines do, but you have to know which direction you're going. The cropping routine, HBORD$, is identically his "SPRAY" program from the same

continued on next page

article. I'd also like to acknowledge Mark Huss for help on the text writing routine, PROG$. This routine was originally coded in BASIC, but was very slow (two minutes for a line of 20 characters of height 3). Thanks also to Jimmy Snyder, who gave me some hints on trapping disk write errors from machine language.

Typing PICUTE can be a chore. It is written without the use of any special ATARI characters, so it can be transferred in listed form over telephone data connections that use pure ASCII (all Bulletin Boards). But if you don't have a modem, I am willing to save you the trouble of typing it in. Send a blank, formatted diskette (single density), a stamped self-addressed mailer, and three dollars to:

William W. Hough
1638 Stephens Drive
Wayne, Pennsylvania 19087

If you send seven dollars, I'll use my disk and postage. Kathy tells me that she will throw in a few of her masterpieces. (If you have MICROPAINTER pictures of your own that you would like to share, the disk you send doesn't have to be blank, but please attach a note that it contains picture files.) No cassettes, please.

```
19 REM : *****************************
29 REM : *  PICUTE  by W. W. Hough  *
39 REM : * for ANTIC Magazine 8/83 *
49 REM : *****************************
100 Z=0:C=1:C2=C+C:C3=C2+C:C4=C2+C2:C5
=C+C4:C6=C+C5:C20=C4*C5:C40=C20+C20:PI
C=120:ZAP=110:CONS=53279:GOTO 1110
109 REM : Typo announcement (ZAP)
110 POKE 712,68:SOUND Z,136,12,14:FOR
B=C TO 60:NEXT B:SOUND Z,Z,Z,Z:POKE 71
2,Z:RETURN
119 REM : Display picture (PIC)
120 FOR I=C2 TO C4:POKE 706+I,CX(I):NE
XT I:POKE 712,CX(C)
130 POKE 560,14:POKE 561,C6:POKE 87,7:
POKE 559,SDMCTL
140 IF CROP<>Z THEN RETURN
149 REM : Character transfer
150 POP :IF TXT$="" THEN 240
160 TEXTP=SM+C40*VPOS:POKE 1760,HT:POK
E 1761,COLR
170 FOR J=C TO LEN(TXT$)
180 CHAR=ASC(TXT$(J,J)):IF CHAR=32 THE
N NEXT J
190 CHARFLAG=C:IF CHAR>127 THEN CHAR=C
HAR-128:CHARFLAG=Z
200 IF CHAR<32 THEN CHAR=CHAR+64:GOTO
220
210 IF CHAR>31 AND CHAR<96 THEN CHAR=C
HAR-32
220 CHARPOS=CHARSET+8*CHAR:SCLOC=TEXTP
+C2*(J-C):POKE 1762,CHARFLAG:DUMMY=USR
(ADR(PROG$),CHARPOS,SCLOC)
230 NEXT J:TXT$=""
239 REM : Select path from picture
240 POKE CONS,7:SOUND Z,121,10,10:FOR
I=C TO 100:NEXT I:SOUND Z,Z,Z,Z
250 IF PEEK(CONS)=C3 THEN 1140
260 IF PEEK(CONS)=C6 THEN IO=8:GOTO 46
0
270 IF PEEK(CONS)=C5 THEN 510
280 GOTO 250
289 REM : I/O Routines and traps
290 POP :GRAPHICS Z:POKE 559,SDMCTL:GO
SUB ZAP:POKE 709,12:TRAP 290
300 IF IO=C4 THEN ?:? "No such pictur
e on disk--DIRECTORY:":?:GOSUB 380:?
:? "Press OPTION":GOTO 240
310 IF ERR=162 OR PEEK(195)=162 OR PEE
K(195)=139 THEN ?:? "NO ROOM ON DISK"
:? :? :GOTO 350
320 FILE$="D:WWXXYYZZ.PIC":OUTFLAG=C3:
GOTO 410
330 ?:? "An error was encountered on
output.":? "I wrote your picture in a
file"
340 ? "called 'WWXXYYZZ.PIC'.":? :?
350 GOSUB 380:OUTFLAG=Z:ERR=Z:?:? "Pr
ess START"
360 IF PEEK(CONS)=C6 THEN GOTO PIC
370 GOTO 360
380 CLOSE #C:OPEN #C,C6,Z,"D:*.*":TRAP
 400
390 INPUT #C,TXT$:? TXT$:GOTO 390
400 CLOSE #C:TXT$="":RETURN
410 CLOSE #C:TRAP 290:OPEN #C,IO,Z,FIL
E$
420 POKE IOCB+C2,IO+C3:POKE IOCB+C5,IN
T(BUF/256):POKE IOCB+C4,BUF-256*PEEK(I
OCB+C5):POKE IOCB+8,C4:POKE IOCB+9,30
430 DUMMY=USR(1536):ERR=PEEK(705):IF E
RR=162 THEN 290
440 IF OUTFLAG=C3 THEN 330
450 CLOSE #C:RETURN
460 GRAPHICS Z:? CHR$(125):POKE 709,12
:POKE 702,64:TRAP 460
470 FOR I=C TO C4:POKE SM+7679+I,CX(I)
:NEXT I
480 ?:? "Enter name of the OUTPUT pic
ture file":FILE$="":INPUT FILE$:OUTFIL
E$="D:":OUTFILE$(C3)=FILE$
490 IF FILE$="" THEN GOSUB ZAP:GOTO 48
0
500 FILE$=OUTFILE$:BUF=SM:POKE 559,Z:G
OSUB 410:GOTO PIC
509 REM : Pick your change
510 ANOTHER=C3:GRAPHICS Z:POKE 709,12:
?:?:? "Do you want to:":?:? "   Add
";CHR$(212);"ext":? :? "   ";
520 ?CHR$(205);"ove Picture":?:? "
 Add ";
530 ?CHR$(194);"orders (crop)":?:? "
  Change ";CHR$(195);"olors":?:?:?
"Type T, M, B, or C (or RETURN)"
540 INPUT ANS$:IF ANS$="T" THEN GOSUB
1000:GOTO PIC
550 IF ANS$="" THEN GOTO PIC
560 IF ANS$="B" THEN 790
570 IF ANS$="M" THEN GOSUB 600:GOTO PI
C
580 IF ANS$="C" THEN GOSUB 660:GOTO PI
C
```

```
590 GOSUB ZAP:GOTO 540
599 REM : Internal move
600 MOVEFLAG=C3:? CHR$(125):? :GOSUB 1
310:MOVEFLAG=Z
610 IF OFFSET<Z THEN DUMMY=USR(ADR(MOV
EN$),SM-7680-OFFSET,SM-7680,23060+OFFS
ET)
620 IF OFFSET>Z THEN DUMMY=USR(ADR(MOV
EP$),SM+15360-OFFSET,SM+15360,23040-OF
FSET)
629 REM : Vertical correction
630 IF HOFF=Z THEN RETURN
640 IF HOFF<Z THEN HOFF=C40+HOFF
650 DUMMY=USR(ADR(VCOR$),HOFF,SM+INT(O
FFSET/C40)*C40):RETURN
659 REM : Change colors
660 ?CHR$(125):? :? "Which of the fou
r colors do you want":? "to change? E
nter 1-4 or ";CHR$(193);"LL ";
670 INPUT ANS$:IF ANS$="A" THEN J=C:K=
C4:GOTO 700
680 IF ANS$<"1" AND ANS$>"4" THEN GOSU
B ZAP:GOTO 670
690 J=VAL(ANS$):K=J
700 FOR I=J TO K:? :? "Enter new color
 (COLOR ";I;")"
710 TRAP 710:? "    Color (0-15) ";:
INPUT CX:IF CX<Z OR CX>15 THEN GOSUB Z
AP:GOTO 710
720 TRAP 720:? " Luminance (0-14) ";:
INPUT LX:IF LX<Z OR LX>14 THEN GOSUB Z
AP:GOTO 720
730 CX(I)=16*CX+LX:NEXT I
740 IF J<>K THEN RETURN
750 ? :? "Do you want to change anothe
r color ?"
760 INPUT ANS$:IF ANS$="Y" THEN 660
770 IF ANS$="N" THEN RETURN
780 GOSUB ZAP:GOTO 760
789 REM : Crop picture
790 ?CHR$(125):? :? "Enter color of b
order (1-4 or ";CHR$(205);"IXED)"
800 INPUT ANS$:IF ANS$="M" THEN ? :? "
Enter byte for mixed color (1-254)"
810 TRAP 810:IF ANS$="M" THEN INPUT BY
TE:IF BYTE<C OR BYTE>254 THEN GOSUB ZA
P:GOTO 810
820 IF ANS$="M" THEN 850
830 IF ANS$<"1" OR ANS$>"4" THEN GOSUB
 ZAP:GOTO 800
840 BYTE=(VAL(ANS$)-1)*85
850 ? :? "Do you want to crop ";CHR$(2
12);"OP, ";CHR$(194);"OTTOM, ";CHR$(20
4);"EFT"
860 ? "SIDE, or ";CHR$(210);"IGHT SIDE
 ";
870 INPUT ANS$:IF ANS$="T" THEN ITEM$=
"scan lines down":EDGE$="top":LIM=192:
GOSUB 920:GOTO 950
880 IF ANS$="B" THEN ITEM$="scan lines
 up":EDGE$="bottom":LIM=192:GOSUB 920:
GOTO 960
890 IF ANS$="L" THEN ITEM$="spaces":ED
GE$="left side":LIM=C40:GOSUB 920:GOTO
 970
900 IF ANS$="R" THEN ITEM$="spaces":ED
GE$="right side":LIM=C40:GOSUB 920:GOT
O 980
910 GOSUB ZAP:GOTO 870
920 ? :? "How many ";ITEM$;" from ";ED
GE$:? "(0 to ";LIM;") ";
930 TRAP 930:INPUT CROP:IF CROP<Z OR C
ROP>LIM THEN GOSUB ZAP:GOTO 930
940 GOSUB PIC:RETURN
950 DUMMY=USR(ADR(HBORD$),BYTE,SM,C40*
CROP):GOTO 990
960 DUMMY=USR(ADR(HBORD$),BYTE,SM+7680
-C40*CROP,C40*CROP):GOTO 990
970 FOR I=SM TO SM+7640 STEP C40:DUMMY
=USR(ADR(HBORD$),BYTE,I,CROP):NEXT I:G
OTO 990
980 FOR I=SM+C40-CROP TO SM+7680-CROP
STEP C40:DUMMY=USR(ADR(HBORD$),BYTE,I,
CROP):NEXT I
990 CROP=Z:GOTO 240
999 REM : Input display characters
1000 ?CHR$(125):? :? "ENTER TEXT (max
imum of 20 characters, and use initial
 spaces to offset"
1010 ? "text from left margin):":? :?
" <<<20--CHARACTERS>>>"
1020 INPUT TXT$:POKE 694,Z:POKE 702,64
:IF TXT$="" THEN RETURN
1030 ? :?"Do you want (1) REGULAR HEI
GHT (ala":? "Graphics 1) or (2) DOUBLE
 HEIGHT":? "(ala Graphics 2) ";
1040 ? "or higher up to 5":? "times re
gular ?";
1050 TRAP 1050:? " Enter 1 to 5 ";:IN
PUT HT:IF HT<C OR HT>C5 THEN GOSUB ZAP
:GOTO 1050
1060 ? :?"Enter vertical position (fr
om top)":? "where you want top of text
 (0 to ";192-8*HT;")"
1070 TRAP 1070:INPUT VPOS:IF VPOS<Z OR
 VPOS>192-8*HT THEN GOSUB ZAP:GOTO 107
0
1080 ? :? "What color do you want for
your text?"
1090 TRAP 1090:? "Enter 1-4 ";:INPUT C
OLR:IF COLR<C OR COLR>C4 THEN GOSUB ZA
P:GOTO 1090
1100 COLR=COLR-C:RETURN
1109 REM : Initialization
1110 IF PEEK(581)=Z THEN POKE 581,PEEK
(106)
1120 DIM TXT$(C20),INFILE$(14),OUTFILE
$(14),FILE$(14),ANS$(C),CX(C4),ITEM$(1
5),EDGE$(10)
1130 CHARSET=224*256:BLANK=C2:POKE 106
,PEEK(581)
1140 TXT$="":HOFF=Z:VOFF=Z:HT=Z:OFFSET
=Z:COLR=Z:OUTFILE$="":OUTFLAG=Z:ANOTHE
R=Z
1150 GRAPHICS Z:POKE 709,12:? CHR$(125
):? :? "     PICUTE   by  W. W. HOUG
H":? :?
```

continued on next page

```
1160 ? "A Utility for Creating and Modifying":? "High Resolution MICROPAINTER Screens"
1170 ? :? :? "After your picture is displayed"
1180 ? "and a tone sounds, the program is":? "waiting for your input. Press:"
1190 ? :? "    START to save modified picture":? "    SELECT to change picture":? "  OPTION to start over":?
1200 ? :? "If you would like to see the disk":? "directory now, press SELECT. To go":? "on, press START.";
1210 IF BLANK=C2 THEN ? "  To make a blank":? "picture, press OPTION.";
1220 IF PEEK(CONS)=C6 THEN ?CHR$(125):GOTO 1260
1230 IF PEEK(CONS)=C5 THEN ?CHR$(125):GOSUB 380:GOTO 1260
1240 IF PEEK(CONS)=C3 AND BLANK=C2 THEN BLANK=C:GOTO 1390
1250 GOTO 1220
1260 POKE 702,64:? :? :? "Enter name of the INPUT picture file ":FILE$="":INPUT FILE$
1270 INFILE$="D:":INFILE$(C3)=FILE$:IF FILE$="" THEN GOSUB ZAP:GOTO 1260
1279 REM : Input move increments
1280 ?CHR$(125):? :? :? "Do you want to move ";FILE$;" ";:INPUT ANS$:IF ANS$="Y" THEN 1310
1290 IF ANS$="N" THEN 1380
1300 GOSUB ZAP:GOTO 1280
1310 ? :? "Enter horizontal offset (-20 to 20)"
1320 TRAP 1320:INPUT HOFF:IF HOFF<Z-C20 OR HOFF>C20 THEN GOSUB ZAP:GOTO 1320
1330 ? :? "Enter vertical offset (-192 to 192)"
1340 TRAP 1340:INPUT VOFF:IF VOFF<-192 OR VOFF>192 THEN GOSUB ZAP:GOTO 1340
1350 IF HOFF<Z THEN VOFF=VOFF+C
1360 OFFSET=HOFF+C40*VOFF
1369 REM : Exit if not first init.
1370 IF MOVEFLAG=C3 OR ANOTHER=C3 THEN RETURN
1380 IF RSFLAG=C3 THEN 1730
1390 SDMCTL=PEEK(559):IOCB=848
1400 GRAPHICS 24:IF PEEK(704)=Z THEN POKE 704,PEEK(89)-16
1410 SCREEN=PEEK(704):POKE 89,SCREEN:SM=SCREEN*256+PEEK(88):POKE 559,Z
1419 REM : Access to OS I/O
1420 FOR I=Z TO 10:READ B:POKE 1536+I,B:NEXT I:RSFLAG=C3
1430 DATA 104,162,16,32,86,228,152,141,193,2,96
1439 REM : Positive internal moves
1440 DIM MOVEP$(56):FOR I=C TO 56:READ B:MOVEP$(I,I)=CHR$(B):NEXT I
1450 DATA 104,104,133,204,104,133,203,104,133,206,104,133,205,104,133,208,104,133,207,164,207,136,192,255,240
1460 DATA 7,177,203,145,205,24,144,244,166,208,240,18,160,255,198,204,198,206,177,203,145,205,136,192,255
1470 DATA 208,247,202,208,238,96
1479 REM : Negative internal moves
1480 DIM MOVEN$(54):FOR I=C TO 54:READ B:MOVEN$(I,I)=CHR$(B):NEXT I
1490 DATA 104,104,133,204,104,133,203,104,133,206,104,133,205,104,133,208,104,133,207,166,208,240,16,160,0
1500 DATA 177,203,145,205,200,208,249,230,204,230,206,202,208,242,160,255,200,196,207,240,7,177,203,145,205
1510 DATA 24,144,244,96
1519 REM : Horizontal borders
1520 DIM HBORD$(47):FOR I=C TO 47:READ B:HBORD$(I,I)=CHR$(B):NEXT I
1530 DATA 104,104,104,133,203,104,133,205,104,133,204,104,133,207,104,133,206,165,203,166,207,240,12,160,0
1540 DATA 145,204,136,208,251,230,205,202,208,246,164,206,136,192,255,240,4,145,204,208,247,96
1549 REM : Transfer & write character
1550 DIM PROG$(189):FOR I=C TO 189:READ B:PROG$(I,I)=CHR$(B):NEXT I
1560 DATA 104,104,133,205,104,133,204,104,133,207,104,133,206,169,0,141,230,6,160,4,173,226,6,208,14
1570 DATA 24,13,225,6,136,240,4,10,10,144,246,141,231,6,173,224,6,141,233,6,160,4,169,0,153
1580 DATA 233,6,136,208,250,162,0,172,230,6,177,204,141,232,6,160,0,30,234,6,30,234,6,30,236
1590 DATA 6,30,236,6,24,14,232,6,144,11,173,225,6,29,236,6,157,236,6,176,8,169,3,29,234
1600 DATA 6,157,234,6,200,192,4,208,214,232,224,2,208,207,173,226,6,208,50,160,0,173,231,6,57
1610 DATA 234,6,145,206,200,192,2,208,243,24,144,16,206,233,6,208,159,238,230,6,169,8,205,230,6
1620 DATA 208,143,96,165,206,105,40,133,206,144,232,165,207,105,0,133,207,144,224,160,0,177,206,57,234
1630 DATA 6,25,236,6,145,206,200,192,2,208,241,24,144,220
1639 REM : Vertical correction
1640 DIM VCOR$(55):FOR I=C TO 55:READ B:VCOR$(I,I)=CHR$(B):NEXT I
1650 DATA 104,104,104,133,204,104,133,208,133,206,104,133,207,162,193,165,207,24,105,40,133,205,144,2,230
1660 DATA 206,160,0,177,205,145,207,200,196,204,208,247,202,240,14,165,207,24,105,40,133,207,144,222,230
1670 DATA 208,24,144,217,96
1680 DL=PEEK(560)+256*PEEK(561):POKE DL+C3,78:POKE DL+C5,SCREEN:FOR I=DL+C6 TO DL+201
1690 IF PEEK(I)=15 THEN POKE I,14
```

continued on page 103

Escher Sketcher

Isometric illusions Isometric illusions

by BENJAMIN BARTELS

The artistic illusions of M.C. Escher are familiar to many. Birds change to fish, water runs uphill, and men climb stairs that seem to be descending. His techniques inspired me to design a program that creates similar isometric improbabilities.

My Escher Sketcher is an isometric sketch pad that uses the joystick to draw boxes and lines in isometric view. When the joystick is moved in the typical four directions, cubes will be drawn on a two-dimensional plane. When the fire button is pressed, the joystick stacks cubes above or below the main plane, giving an illusion of depth. A variety of colors for the blocks is possible, and a "line" mode is included to embellish your designs.

This program uses GTIA Graphics Mode 10. If you do not have a GTIA chip in your ATARI, you will need to install one in order to use this program.

At the start of the program you will be prompted for background color, cursor color, and two different color combinations. The combinations are for the two cube shapes which you can draw; box 1 and box 2. Colors correspond to Table 9.3 on page 50 of your ATARI BASIC Reference Manual. If you press [RETURN] at these prompts, the program will use a set of default colors.

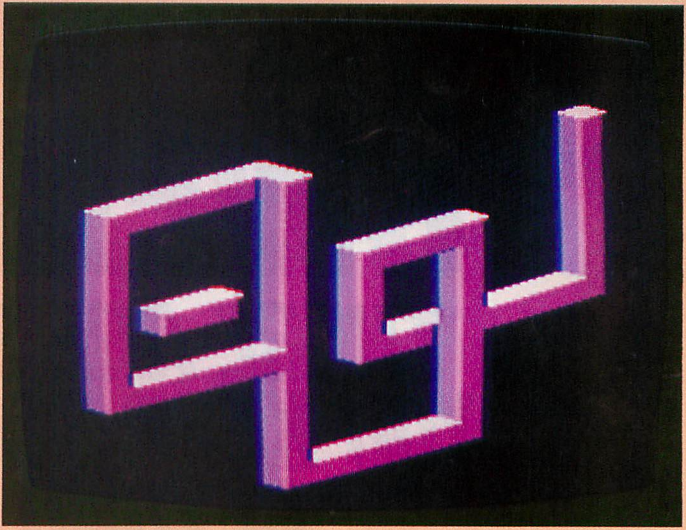
When you have selected all your colors, press [START] to begin drawing. At this point, you will see a flashing cursor which you can move about the screen without drawing. To draw a line with this cursor, push [SELECT]. To move the cursor without drawing, push [SELECT] again.

The [START] button toggles between drawing boxes and moving the cursor. You can use [SELECT] in Box Draw Mode to change the selection of the next box to be drawn between box 1 and box 2.

In either mode, you can use the [OPTION] key to erase the screen and start over.

PROGRAM BREAKDOWN

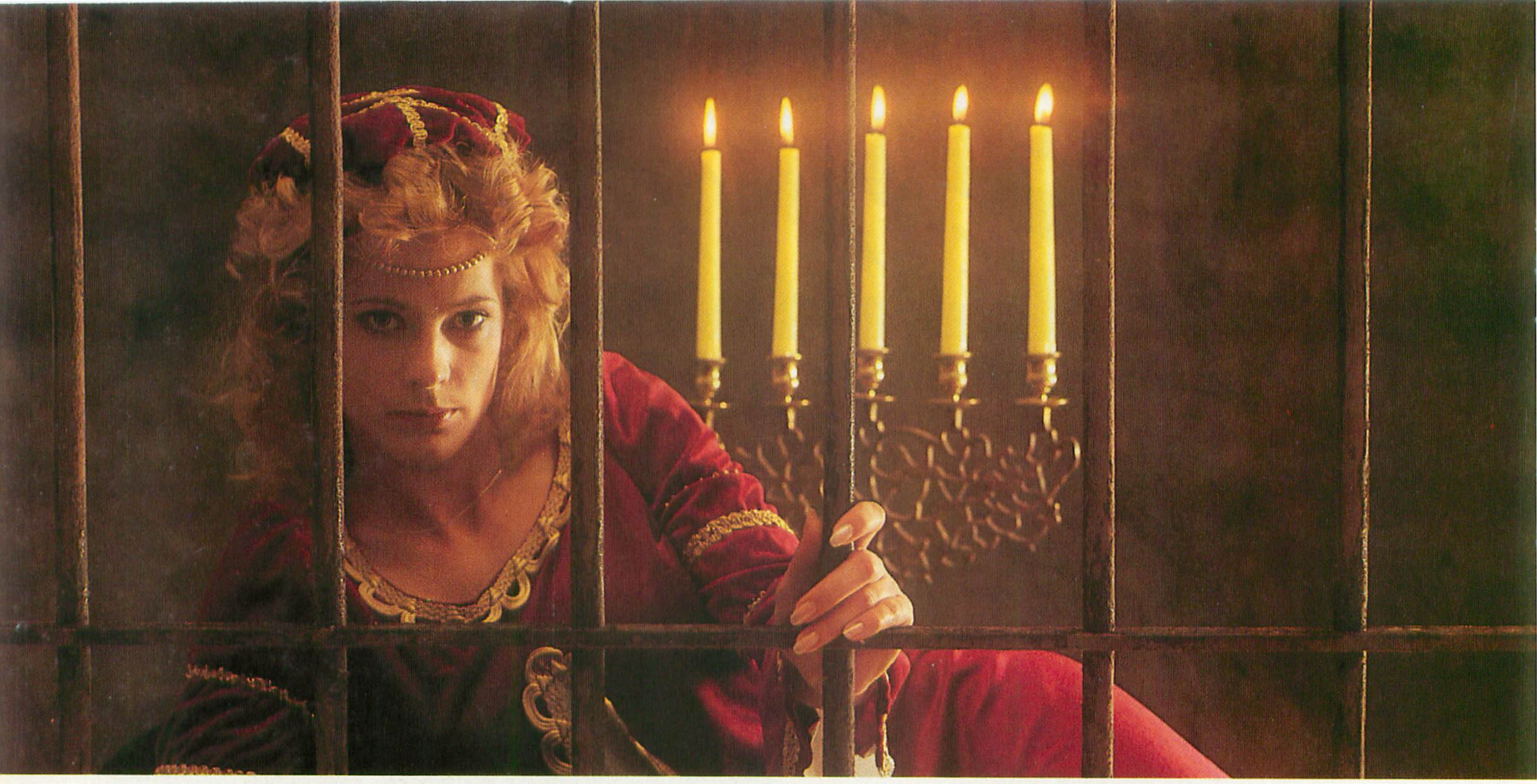
10-95 Opening program housekeeping.
100-190 User message and screen preparation.
200-290 Position cursor.
300-390 Main program loop.



400-430 Change box colors — note toggle feature.
900-990 Prepare to draw box by setting X and Y coordinates.
1000-1990 Draw top of box.
1199-1150 Subroutines to draw fiigure.
2000-2990 Draw left side.
3000-3990 Draw right side.

```
10 REM *** PRE-SELECT ***
15 DIM CLLR(2,3),D(4)
20 GRAPHICS 0:SETCOLOR 2,0,0:? "ISO-SKETCH by BENJAMIN BARTELS"
30 ?:? "COLOR(0-15),LUM(0-14)":?:? "INPUT BACKGOUND COLOR AND LUM."
32 TRAP 35:BAK=0:INPUT I,J:BAK=I*16+J
35 ? "INPUT CURSOR COLOR AND LUM.":TRAP 40:CSSR=15:INPUT I,J:CSSR=I*16+J
40 ?:? "BOX #1":? "INPUT TOP COLOR AND LUM.":TRAP 50:CLLR(1,1)=6:INPUT I,J:CLLR(1,1)=I*16+J
50 ? "INPUT RIGHT COLOR AND LUM.":TRAP 60:CLLR(1,2)=4:INPUT I,J:CLLR(1,2)=I*16+J
```

continued on page 98



GWENDOLYN.

THERE ARE SOME THINGS YOU KEEP SEARCHING FOR, BEYOND REASON.

Kidnapped in revenge and locked in hatred somewhere deep beneath your castle, is your princess.

Gwendolyn.

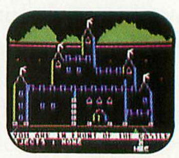
The prosperity of your kingdom, the end of a bitter feud, your very future depend on finding her.

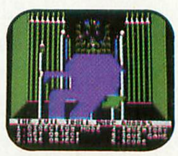
You swear that no obstacle can stop you. But the high-resolution, 3-D graphics, animation and sound effects make the obstacles that await you more formidable than you can imagine.

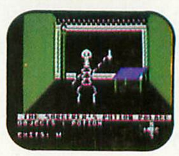
And with over ninety different screens and two full sides of play, those obstacles and the decisions you must make can appear endless. In fact, you may have to endure hours of searching to rescue Gwendolyn.

But for her, you would endure anything, wouldn't you?

Gwendolyn—a non-violent, intermediate graphic adventure game, written by Marc Russell Benioff, Atari 40K Disk $27.95, Artworx Software Co., Inc., 150 N. Main St., Fairport, N.Y. 14450. For a free catalog of Artworx Software for the Atari, Apple, VIC-20 & Commodore 64 computers, write or call 800-828-6573.







These are just three of over ninety exciting screens.

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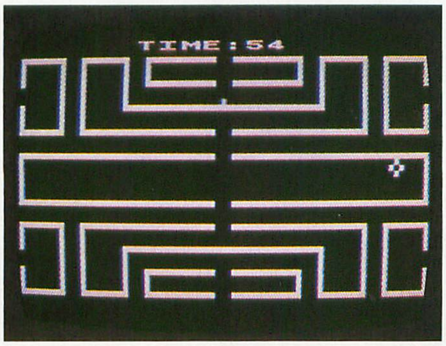
Atari, Apple, VIC-20 & Commodore 64 are registered trademarks.

MAZE MANIAC

by SCOTT McKISSOCK

PAGE FLIPPING

NOTE!! – The screen will go blank for about 30 seconds before the game starts.



Page flipping is a graphics programming technique that you can use to instantly switch the screen display from one picture to another. Maze Maniac uses this technique to switch you between six different full-screen mazes, each with a different prize and its own distinctive color. The object of the game is to collect all six prizes as many times as possible within the time limit. You must clear all mazes of prizes before the rooms can be restocked with prizes.

We cannot provide you with a complete tutuorial on page flipping here. However, we hope that this brief explanation and the program take-apart below will intrigue you enough to start exploring these topics on your own.

To understand page flipping, you should know about three two-byte memory locations. Each of these locations holds an address in "low-byte high-byte" form, which means that value of the second byte of the location should be multiplied by 256, then added to the value of the first byte at the location. The sum is itself an address to which the program is directed. The address of the display list is found at 560 and 561, the screen display address is found at the fifth and sixth bytes in the display list, and the address of the area of memory which BASIC uses for drawing is found at location 88 and 89 (called SAVMSC).

When you first call a graphics mode, for example GRAPHICS 20 (4 + 16), as in this program, the screen addresses in the display and in SAVMSC are the same. However, you can POKE new values into SAVMSC that will tell BASIC to execute any subsequent graphics commands in any section of RAM that you specify. Of course, areas of RAM that are used by the program or by BASIC should not be used. To flip to the new screen, simply change the fifth and sixth bytes of the display list to point to the new screen memory.

—David Duberman

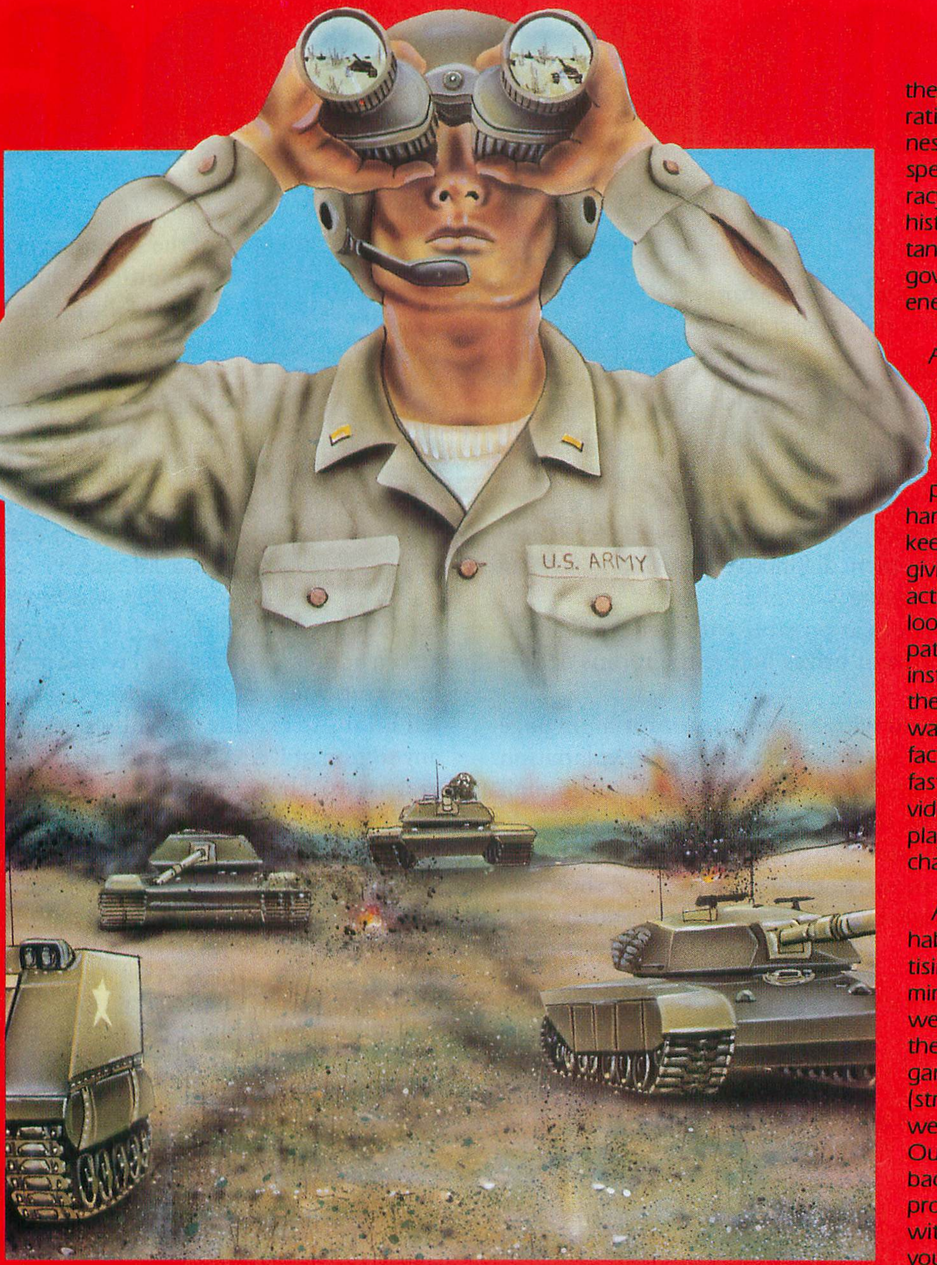
Turn to page 60 for **TAKE-APART.**

```
1 GOTO 700
10 X=40:Y=23:POKE DL,SAV-2*R:POKE 89,S
AV-2*R
15 T=TT:POKE 87,1:POSITION 11,0:? #6;T
:POKE 87,4
20 IF PEEK(20)>58 THEN T=T-1:SOUND 0,T
+20,10,PZ+1:POKE 20,0:POKE 87,1:GOTO 4
0:REM CHECK TIME
25 S=STICK(0):V=(S=13)-(S=14):H=(S=7)-
(S=11):COLOR 0:PLOT X,Y:X=X+H:Y=Y+V:LO
CATE X,Y,Z:IF Z<>0 THEN 65
30 COLOR 3:PLOT X,Y
35 IF Y=2 THEN COLOR 0:PLOT X,Y:Y=43:S
CR=2*U(R):R=U(R):GOTO 60
36 IF Y=44 THEN COLOR 0:PLOT X,Y:Y=3:S
CR=2*D(R):R=D(R):GOTO 60
37 IF X=79 THEN COLOR 0:PLOT X,Y:X=2:S
CR=2*R(R):R=R(R):GOTO 60
38 IF X=1 THEN COLOR 0:PLOT X,Y:X=78:S
CR=2*L(R):R=L(R):GOTO 60
39 GOTO 20
40 POSITION 11,0:? #6;T;"  ":POKE 87,4:
REM CHANGE TIME
45 IF T=0 THEN COLOR 0:PLOT X,Y:GOTO 6
00:REM GAME OVER?
50 IF SCR=-1 THEN SOUND 0,0,0,0:GOTO 2
5
55 POKE DL,SAV-SCR:SCR=-1:SETCOLOR 0,R
*2,6:GOTO 20
60 POKE 87,1:POKE 89,SAV-SCR:GOTO 40
65 IF Q(R)*8+7>X OR Q(R)*8+9<X OR B(R)
*4+4>Y OR B(R)*4+6<Y THEN X=X-H:Y=Y-V:
GOTO 30:REM CHECK FOR PRIZE
70 Q=Q(R)*8+8:B=B(R)*4+5:Q(R)=0:B(R)=0
:PZ=PZ+1
```

continued on page 59

Scott McKissock is a sophomore at Camp LeJeune High School in North Carolina. His maze game is devilishly hard, requiring the player to discover and remember the relationship of the various mazes to each other.

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MAZE MANIAC *continued from page 57*

```
75 FOR P=1 TO PZ:SOUND 0,60,10,15:FOR
N=1 TO 25:NEXT N:SOUND 0,0,0,0:FOR N=1
 TO 20:NEXT N:NEXT P
80 COLOR 0:PLOT Q,B-1:PLOT Q,B+1:PLOT
Q-1,B:PLOT Q+1,B:IF PZ=6 THEN 200
90 GOTO 20
100 GRAPHICS 20:DL=PEEK(560)+PEEK(561)
*256+5:POKE DL-2,70:POKE DL+44,65:POKE
 DL+45,PEEK(560)
110 POKE DL+46,PEEK(561):R=1:IF ST=0 T
HEN SAV=PEEK(DL):POKE 89,SAV-2:GOTO 40
0:REM CHANGE DISPLAY LIST
120 R=6:X=40:Y=23:POKE DL,SAV-2*R:GOTO
 10
200 GOSUB 300
210 TT=TT-5:L=L+1:REM LEVEL FINISHED
220 POKE 106,P106-18:GRAPHICS 18:POSIT
ION 2,1:? #6;"CONGRATULATIONS!"
230 POKE 708,118:POSITION 1,3:? #6;"YO
U HAVE COMPLETED        LEVEL ";L
240 SCORE=SCORE+T*L+PZ:POSITION 6,6:?
#6;"SCORE ";SCORE:POSITION 5,9:? #6;"P
RESS FIRE"
250 POKE 710,10:POKE 106,P106:PZ=0:IF
STRIG(0)=0 THEN GOTO 100
260 POKE 710,14:GOTO 250
300 POKE 106,P106:POKE 87,4:COLOR 3:R=
1:REM PUT IN NEW PRIZES
310 SOUND 0,R*40,10,6:SOUND 1,R*40+2,1
0,6:POKE 106,P106-2*R:POKE 89,SAV-2*R:
POKE DL,SAV-2*R
320 Q(R)=INT(RND(0)*9):B(R)=INT(RND(0)
*9):Q=Q(R)*8+8:B=B(R)*4+5:LOCATE Q,B,Z
330 IF Z<>0 THEN 320
350 PLOT Q-1,B:PLOT Q+1,B:PLOT Q,B+1:P
LOT Q,B-1:R=R+1:IF R<7 THEN GOTO 310
360 R=6:SOUND 0,0,0,0:SOUND 1,0,0,0:PO
KE 89,SAV-2*R:RETURN
400 POKE 87,1:POSITION 6,0:? #6;"TIME:
    ":POKE 87,4:COLOR 1:Y=3:REM DRAW SC
REENS
410 READ X,XD:IF X=0 THEN 440
420 PLOT X,Y:DRAWTO XD,Y:PLOT 80-X,Y:D
RAWTO 80-XD,Y:PLOT X,46-Y:DRAWTO XD,46
-Y:PLOT 80-X,46-Y:DRAWTO 80-XD,46-Y
430 GOTO 410
440 IF XD<>0 THEN Y=Y+4*XD:GOTO 410
450 X=2
460 READ Y,YD:IF Y=0 THEN 490
470 PLOT X,Y:DRAWTO X,YD:PLOT X,46-Y:D
RAWTO X,46-YD:PLOT 80-X,46-Y:DRAWTO 80
-X,46-YD:PLOT 80-X,Y:DRAWTO 80-X,YD
480 GOTO 460
490 IF YD>0 THEN X=X+4*YD:GOTO 460
495 IF R=6 THEN POKE 89,SAV-2*R:POKE D
L,SAV-2*R:POKE 559,34:GOSUB 300:ST=1:G
OTO 10
499 R=R+1:POKE 106,P106-2*R:POKE 89,SA
V-2*R:GOTO 400
500 DATA 2,10,14,22,26,38,0,1,2,10,0,1
,2,14,0,1,2,22,0,1,2,26,0,0,3,7,11,15,
19,27,0,3,3,11
505 DATA 0,2,3,11,0,1,3,19,0,3,3,21,0,
0
510 DATA 2,10,14,22,26,38,0,1,26,38,0,
1,22,40,0,1,2,10,14,38,0,1,2,38
515 DATA 0,0,3,7,11,15,19,27,0,2,3,15,
0,1,3,15,0,2,3,11,0,1,3,7,0,0
520 DATA 2,10,14,22,26,38,0,3,2,22,26,
38,0,1,2,34,0,0,3,7,11,15,19,23,0,5,3,
15,0,1,3,15,0,3,15,23,0,0
530 DATA 2,10,14,22,26,38,0,1,22,40,0,
1,14,40,0,1,2,6,10,38,0,1,6,38,0,0,3,7
,11,15,19,23,0,1,15,19,0,1
535 DATA 3,15,0,1,3,11,0,3,0,0
540 DATA 2,10,14,22,26,38,0,1,2,22,0,1
,6,26,0,1,2,38,0,1,6,38,0,0
545 DATA 3,7,11,15,19,27,0,6,3,11,0,3,
3,15,19,23,0,0
550 DATA 2,10,14,22,26,38,0,1,2,26,30,
40,0,1,6,30,34,40,0,1,2,34,0,1,6,38,0,
1,10,38,0,0
555 DATA 3,7,11,15,19,27,0,1,19,23,0,5
,3,7,0,1,7,11,0,1,11,15,0,1,15,19,0,0
560 DATA 2,10,14,22,26,38,0,1,2,26,30,
40,0,1,6,30,34,36,0,1,2,34,0,1,6,36,0,
0
565 DATA 3,7,11,15,19,27,0,1,19,23,0,5
,3,7,0,1,7,11,0,1,11,15,0,1,15,19,0,0
600 R=0:POKE 106,P106:COLOR 0:REM GAME
 OVER
610 R=R+1:POKE 106,SAV-2*R:POKE 89,SAV
-2*R:Q=Q(R)*8+8:B=B(R)*4+5:PLOT Q,B-1:
PLOT Q,B+1:PLOT Q-1,B:PLOT Q+1,B
615 IF R<6 THEN GOTO 610
620 GOSUB 300
630 POKE 106,P106-18:GRAPHICS 18:POKE
708,56:POSITION 5,2:? #6;"game over
     SCORE ";SCORE+PZ
640 POSITION 4,8:? #6;"PRESS START"
650 IF PEEK(53279)=6 THEN POKE 106,P10
6:L=0:PZ=0:TT=100:SCORE=0:GOTO 100
660 GOTO 650
700 POKE 559,0:SCR=-1:TT=100:P106=PEEK
(106)
710 ER=P106-16:FOR I=ER*256 TO (ER+16)
*256:POKE I,0:NEXT I:REM CLEAR MEMORY
FOR SCREENS
720 DIM U(6),D(6),L(6),R(6),Q(6),B(6)
730 U(1)=4:D(1)=4:L(1)=3:R(1)=2:U(2)=5
:D(2)=5:L(2)=1:R(2)=3
740 U(3)=6:D(3)=6:L(3)=2:R(3)=1:U(4)=1
:D(4)=1:L(4)=6:R(4)=5
750 U(5)=2:D(5)=2:L(5)=4:R(5)=6:U(6)=3
:D(6)=3:L(6)=5:R(6)=4
760 POKE 106,P106:GOTO 100
```

continued on next page

TYPO TABLE

Variable checksum = 445761

Line num	range	Code	Length
1	- 35	JS	521
36	- 60	WK	541
65	-100	TV	595
110	-240	AJ	502
250	-350	RY	562
360	-470	TY	581
480	-520	LI	579
530	-565	RK	539
600	-650	MH	507
660	-740	TN	581
750	-760	CF	196

TAKE-APART FOR MAZE MANIAC

1 Pass control to initialization at 700.

10 Set initial X and Y coordinates, and display room 6.

15 Print time remaining in mode 1 line at top of screen.

20 Uses ATARI's internal realtime clock at location 20 to keep time. Change sound according to time.

25 Read joystick. If new player location is not in background color then branch to 65.

30 If new player location is in background color then plot it.

35-38 If new X or Y position are about to exceed screen boundaries, adjust to put player on opposite side of screen. Determine new SCR, which is the new screen which will be flipped to. R is also adjusted to indicate new room.

39 End of main loop.

40 Print time if necessary.

45 Check for end of game.

50 If not flipping pages, SCR = –1. Branch to stick-read routine.

55 Change DL to display new screen (SCR). Set SCR to –1, no more page flipping until necessary. Change color, return.

60 Set Graphics Mode 1 to print. Set screen address to correct location. GOTO 40 to print time.

65 Branch here if new player location is not in background color. If not a prize, change X and Y and return.

70 If a prize, then pick it up. No more prizes in room. Add one to number of prizes picked up (PZ).

75 A beep for each prize that has been picked up.

80 Erase prize and see if all six have been picked up. If so, then place new prizes.

90 If not, re-enter main loop.

100 After display list. DL = sixth byte of display list. POKE DL–2, 70 changes LMS (load memory scan) byte, putting on one row of GR. 1. POKE DL + 44,65 sets the end of the display list higher to account for the line of GR. 1 at screen top.

110 SAV = high byte of screen memory address in the display list. If ST = 0 (game has just started), then POKE 89 (high byte of SAVMSC) with high byte of screen memory in display list minus two, and control is passed to screen-draw routine at 400.

120 Start in room 6 at coordinates 40,23. POKE DL,SAV –2*R displays screen 6. Then go to main loop at 10.

200 Place prizes for next level.

210 Makes next level harder — 5 seconds less time.

220 POKE 106,P106–18. Lower RAMTOP by 18 pages (4608 bytes) so that message is not placed in memory where rooms are drawn.

240 Score = time left * level + number of prizes.

250 Flash message. If button pressed, re-initialize and start again.

300 Place new prizes. POKE 106,P106 to make sure it has the correct number of pages. POKE 87,4 to plot in mode 4. It starts with room 1.

310 Change sound's pitch depending on which room you're in.

320-330 Find random spot for prize in room. Make sure there is no wall there already.

350 PLOT prize. If all rooms not done, go back and PLOT another prize.

360 All rooms done — turn off sound and RETURN from subroutine.

400 Memory location 87 (DINDEX) contains the current BASIC graphics mode. With a modified display list containing different graphics modes, you POKE this location with

continued on page 62

WHAT IS A TYPO TABLE

Newcomers to ANTIC may wonder about the "Typo Table" that appears at the end of most of our basic listings. TYPO is a program that helps you find typing errors made when entering programs that appear in ANTIC. TYPO will produce a table of values which can be used to pinpoint where an error was made. The TYPO program and instructions originally appeared in Volume 1, Number 3 of ANTIC, and was reprinted in Volume 2, Number 1. The latter issue is still available as a back issue, and the TYPO program itself is included in ANTIC UTILITIES DISK #2. Also, you can obtain a copy of the article by sending a stamped, self-addressed envelope to: c/o ANTIC, 600 18th Street, San Francisco, CA 94107. We regret we cannot fulfill requests unless SASE is included.

NOTE: When comparing your TYPO TABLE with the one we publish, first look at the length column. For a given line number range, if your length is only off by one or two, it may be due to spacing. Missing or extra spaces generally occur between quotes or in a REM statement. Spaces must be accurately placed for TYPO to work, so first experiment with the spacing.

MAZE MANIAC *continued from page 60*

the correct BASIC mode number to write to the area of the screen containing that mode. Therefore, POKE DINDEX with 1 to print in the mode 1 line at screen top, then POKE a 4 to draw in the GRAPHICS 4 area. 3 is the first Y value at which a line is drawn.

410 X is where a point is PLOTted, XD is the point to which it is drawn. If X = 0 then end of line, GOTO 440 to add to Y and start to draw the next line.

410-440 Draw all horizontal lines.

450-490 Draw all vertical lines.

495 If rooms are finished being drawn, display room 6, GOSUB 300 to place prizes, and start game.

499 If not, draw next room. Change memory locations 106 and 89 so it draws them in the right place in memory and return to line 400 to start drawing again.

500 Data for screens.

700 Turn off screen, set time. P106 = number of pages of free RAM.

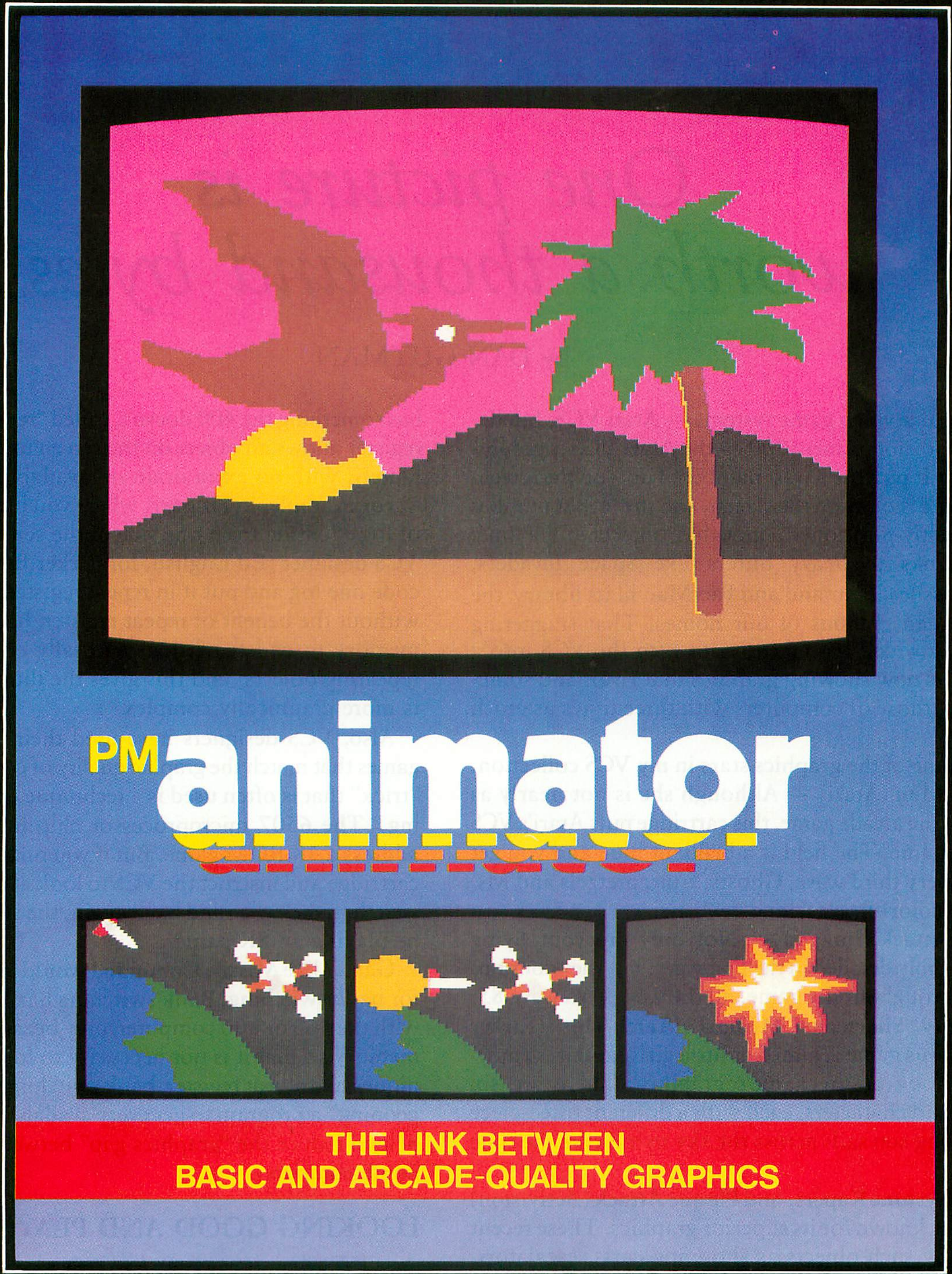
710 Clear 16 pages of memory for screens.

720 Dimensions for variables for up–U(R), down–D(R), left L(R), and right R(R), and the coordinates of the prize–Q(R), B(R). R stands for room number (1–6).

730-750 Gives values for up, down, left, and, right. For instance, if you are in room 1 and you go up, you go to room 4.

760 Set number of pages back to original value. GOTO 100.

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VCS GRAPHICS

One picture is worth a thousand bytes

by DAN GUTMAN

Of all the popular video game systems — Atari VCS, Intellevision, ColecoVision, Atari 5200 — the Atari VCS is graphically the worst. It puts the fewest number of dots on the screen, fewest number of colors on the screen, and the fewest number of independently-positioned, movable objects on a line. However, thanks to heavy hitters like Space Invaders, Asteroids, Missile Command and Pac-Man in its library, the VCS has invaded millions of our homes. That staggering number has provided the incentive to turn the VCS into a machine that is now showing graphics that rival, and sometimes surpass, those of computers with three times as much memory.

Here are some of the graphics stars in my VCS collection.

• **Ms. Pac-Man** (Atari) — Although she is not nearly as spectacular as the arcade game, this cartridge puts Atari's VCS Pac-Man to shame. The field is a brilliant blue and you get a new maze every third wave. Ghosts, fruit, pretzels and Ms. Pac-Man are colorful, clear and realistic.

• **Demon Attack** (Imagic) — Not only are your flying enemies incredibly detailed in the first wave, but they continually change throughout the game, all the way up to wave 85.

• **Strawberry Shortcake Musical Match-Ups** (Parker Brothers) — This game is aimed at little girls, and it is enjoyable just to *look* at the game's graphics. There are six Strawberry Land characters, each with a different three-piece outfit. A smiling sun sails across the sky to indicate the time remaining.

• **Pitfall, Keystone Kapers**, and **Plaque Attack** (Activision) — Activision is known for its superior graphics. These recent releases display such objects as shopping carts, escalators, snakes and packs of french fries — as tiny as two inches tall, but sharp and recognizable.

HOW DO THEY DO IT?

But if the ATARI 400 computer, for the sake of argument, has three times the memory capability of the VCS, shouldn't the graphics on games for the 400 be three times as good as games for the VCS? All other things being equal — yes. But other things are *not* equal. Although the 400 has the capability to display eight independently-positioned, movable objects on the screen (compared with five on the VCS), the VCS has something the 400 doesn't, called "repeat register." Repeat register allows an object on the screen to be duplicated indefinitely, with no extra drain on available memory.

For example, in **Frogger**, where you have an endless series of logs floating from one side of the screen to the other, the VCS designer (Ed English, for Parker Brothers) only had to code one log and put it in repeat register. The 400 designer, without the benefit of repeat register, had to use up a lot of memory to code each log. Virtually every VCS game has repeating objects, and this gives the illusion of a game that is more graphically complex.

Also, VCS designers have used their ingenuity to create games that match the graphic quality of computer games. One "trick" that is often used is a technique called "bank switching." The 6507 microprocessor chip in the VCS can only address a 4K ROM game. But if you put *two* 4K chips in the cartridge and instruct the VCS to look at one, then to rapidly switch to the other and back again, the system will, in effect, be playing an 8K game.

Games like **Missile Command** would look miserable if not for bank switching. Bank switching has not been used much with the 400 or 800 computer, only because each has enough memory so that it is not necessary to fool the system. Techniques like repeat register, bank switching, and simply "bludgeoning" a program to get every available byte out of it, have helped reduce the "graphics gap" between the VCS and the home computer.

LOOKING GOOD AND PLAYING BAD

There is no doubt that good graphics can improve a game. However, it must be remembered that great graphics are not synonymous with "great game." The 4K that is available to the game designer must fit all his or her graphics, sound and play action. If a lot of that space is used for the graphics, it will be necessary to sacrifice some sound and playability.

Last year, Atari released **Earthworld**, the first game in its "Swordquest" series. When you turned the game on, it displayed an incredibly detailed, multicolored sword that led you to expect a graphically superior game. However, the graphics

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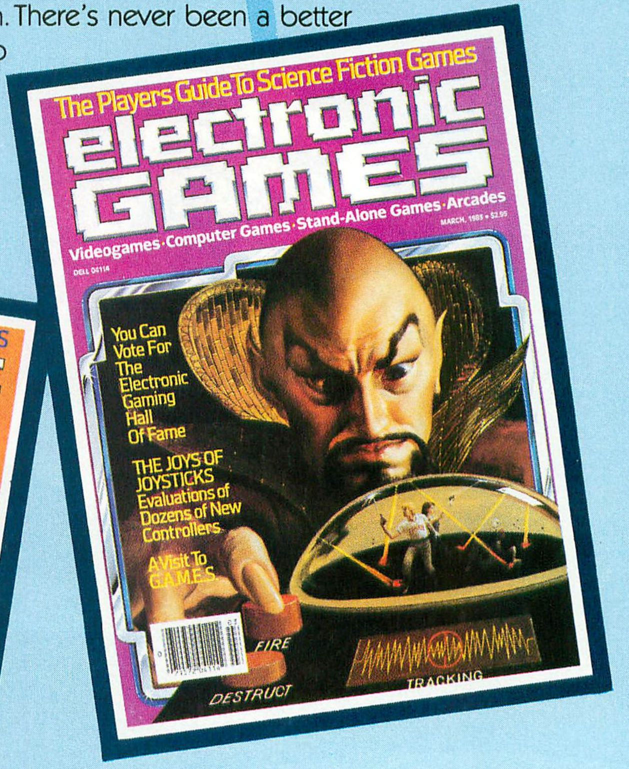
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VCS GRAPHICS *continued from page 64*

on the rest of the game were rather ordinary, and, according to a reliable source, the sword itself took up 2K of the game's memory — one quarter of the total memory available just for the attract mode! You have to wonder what was sacrificed in play action in order to get that sword.

Video games are intended for interaction, not just observation. If the graphics are terrific and the game is lousy, the designer might as well take up painting. It is a very rare game that can display incredible graphics and, at the same time, give us exciting, action-packed play. Pitfall is one such game. The designer, David Crane, could have put less emphasis into the graphics of the game to make Pitfall Harry climb trees or shoot a gun. Instead, he chose to go with the good play action he had and make the graphics superior. These are decisions and tradeoffs that determine the quality of a game. Graphics and game play are a delicate balance.

Graphics are a large part of a game, but *only* a part. Two of the best video games ever, **Space Invaders** and **Asteroids**, were simple, straightforward, and black and white. But just as TV, movies, and photography were pushed inexorably towards better and finer color and resolution, so, we expect, will the market demand the same from computer graphics. In that line of development, the VCS is close to its limit now.

GET YOUR HEAD STRAIGHT

The line on alignment

by CARL EVANS

One of the most misunderstood things about the poor little 410 cassette recorder is head alignment. Properly aligned heads tend to stay properly aligned, provided the recorder isn't physically moved around a lot. If you leave the recorder sitting in one spot, then the head alignment should be good for a long, long time.

I align the heads on any new 410/1010 before I use the recorder for any critical CSAVEs. Then I check the alignment once or twice a year. So far, none of those that I personally aligned have drifted enough to justify realigning them. The oldest one has seen heavy use for almost two years now. This article will show you how to align the heads in your own recorder. It is extremely easy once you know how.

Service shops typically use some very expensive equipment when they align the heads on your recorder. The total cost of professional equipment could easily run into many hundreds of dollars. You can build your own head-alignment kit for under $50. The things you will need are readily available, once you know what to ask for. A head alignment kit usually consists of the following items:

a. A special "test-tone" cassette.

b. One very small Phillips screwdriver.

c. An AC voltage measurement device (such as a DVM).

d. Several small clip leads or connector pins and some wire.

First, let's look at each of these components in more detail, along with what to use to make up your kit, then I will show you how to align the heads in your 410 (or 1010) recorder very quickly and simply.

The most important item in your head-alignment kit is the test tape. A professional tape typically contains a perfectly aligned recording of a sine wave with a frequency somewhere between 1KHz and 5KHz, or a special mix of such tones. I have seen tapes like that for home stereo systems that might cost you as much as $70. That is too much money for such a tape. Fortunately, I recently ran across an ad in a stereo hobbyist magazine for a head alignment tape selling for $15.99. That is more along the lines of what I would consider reasonable. I got one of these tapes and tried it out on one of my 410 recorders. It worked like a charm! The tape is called the "GEO-TAPE" and is sold by Mobile Fidelity in Chatsworth, California. If you want to contact them, call (213) 789-8440.

I looked at the output of the tape on an oscilloscope to see what was really on it. The tape contains a recording of digitally synthesized "pink noise". In simple terms, this is a mixture of a lot of tones all set at a constant volume. This is nice. The problem with aligning your heads with a single audible tone is that you can set the heads for that tone but still lose the high-frequency signals. Actually, this is more important to music buffs, but in our case it means that we can align the recorder heads for both of the ATARI FSK tones in one fell swoop.

The screwdriver, in this case, consists of one very small Phillips for adjusting the head screw. (A Phillips is also called a "cross-point" screwdriver). You can use any miniature-sized Phillips, but be careful. If the screwdriver is highly magnetized, you could be causing yourself headaches. To test the screwdriver for excessive magnetism, touch the tip to a small paper clip and slowly lift the screwdriver. If the end of the paper clip stays



on the table, then the screwdriver is not "too" magnetic.

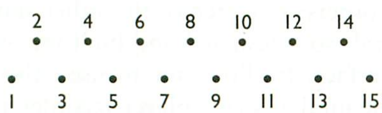
The wire can be any old small gauge wire, such as speaker wire. Multiple-strand wire is usually better than solid wire for this purpose.

You will need either a special connector or some wire to tap into the signal lines of the recorder. Those of you with the ATARI 400 model computer will have to use small stiff wire since you don't have a monitor jack on your computer.

You have two options with the ATARI 800 and only one option with the 400. Lets look first at the one option that is common for both the 400 and the 800.

You can use alligator clips and connector pins (small stiff wire) to jump between the pins on the recorder's I/O connector and the proper pins in the I/O connector on the side of the computer. You can then make your measurements by attaching clip leads to the proper lines. The measurements will be taken from Pin 11 ("+") and Pin 4 (ground).

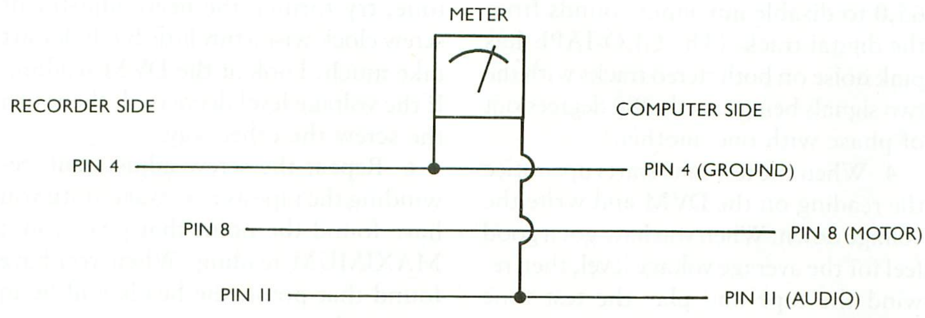
The pin configuration of the serial I/O port on the computer side looks like this:



The configuration of the I/O plug from the recorder is, naturally, the mirror image of this. To make our measurements, it will be necessary to connect three wires. One wire goes from Pin 4 on the computer to Pin 4 into the recorder (this is the ground). One wire connects Pin 8 to Pin 8 (this is the wire that turns the motor on and off). The last wire connects Pin 11 and Pin 11 (this is the audio wire).

We need to measure the voltage between the wires connecting Pins 11 and Pins 4. Scrape through the insulation near the middle of each of these wires so you can take a reading with the leads from the DVM. This reading will give you the strength of the audio channel signal. The motor must be connected so the recorder can play the test tape.

If you have an 800 model, you can



bypass all this wire stuff by measuring at the "MONITOR" output plug located on the side of the computer. The "how-to" part of this article will go into further detail. You may want to get a DIN plug with bare-ended wires coming out of it, to make the job easier. See your APX catalog for the 5-pin DIN connector (APX-9002 for $2.49).

The best AC-voltage measurement device to use would be a digital volt meter (DVM), but if you don't have one of them, there are a number of other things you can use. You can use any type of AC-voltage meter. Or, you could use an oscilloscope. You can get these kinds of instruments at your local electronics store. It is also possible to crudely align the heads using your home stereo amplifier by making your measurements on the "VU" or "S" meter located on many amplifiers. If you have a good musical ear, then you could even use the audio playback coming through your TV speaker!

You now have enough information to create your own head-alignment "kit". Now comes the easy part: actually aligning the heads. The following is a step-by-step way of doing it.

HOW TO THE ALIGN THE RECORDER HEADS

1. If you have an ATARI 400, insert jumper wires as discussed earlier between the connectors on your recorder and your computer. You will make your measurements between Pin 11 ("+") and Pin 4 ("–" or ground).

If you have an ATARI 800, plug the recorder into the computer. You can measure the voltage between Pin 3 and Pin 2 of the Monitor output port. Pin 3 is at upper left, and Pin 2 (ground) is at the bottom. A DIN plug makes this access easier. Connect Pin 3 to the + lead of your DVM, and Pin 2 to the minus, or ground on your DVM.

When you have done this, insert the BASIC cartridge into your computer and turn the computer on. Then POKE 54018,52 and POKE 65,0. The first POKE turns on the cassette motor so you can playback the contents of the audio channel on a cassette. The second POKE makes sure you don't get any noise from the digital channel. Now put the alignment tape in the recorder and listen for the odd hiss it makes to verify that you are getting a reading on your meter or scope. If you are using your stereo, then make sure you can hear the tape noise over your speakers. When you are satisfied that all of the connections are good, then POKE 54018,60 to turn the cassette motor back off.

2. Now take a razor blade or some other thin flat instrument and gently pry the label off of your recorder. This label is the one that says "REC PLAY REWIND" etc. When you have removed this thin metal plate, you will discover a Phillips head screw and a small hole. Ignore the screw and look down into the hole. You will see a tiny Phillips head screw inside the recorder. Now press the PLAY button on the recorder. Notice how the small screw moves toward the back of the recorder, almost, but not quite, out of reach. This is the screw you will have to adjust.

3. Press the STOP/EJECT button on the recorder. Now insert the GEO-TAPE (or other test tape) in the recorder and rewind the tape. Lightly press the STOP/EJECT button to reset the recorder switches. When you are all set, turn the computer on. Now POKE 54018,52 to turn the cassette motor on and POKE

continued on next page

65,0 to disable any input sounds from the digital track. (The GEO-TAPE has pink noise on both stereo tracks with the two signals being exactly 180 degrees out of phase with one another.)

4. When the test tone starts up, notice the reading on the DVM and write the voltage down. When you have got a good feel for the average voltage level, then rewind the tape and play the test tone again.

5. This time, when you hear the test tone, try turning the head adjustment screw clock-wise a tiny little bit. It doesn't take much. Look at the DVM reading. If the voltage level decreased, then turn the screw the other way.

6. Repeat the screw adjustment, rewinding the tape as necessary, until you have found the point that gives you a MAXIMUM reading. When you have found that point, the heads will be in proper alignment.

7. The glue used under the label plate is probably dry and crusty, so you most likely will have to use some fresh glue to stick the label back on your recorder. Be careful not to get glue down the adjustment hole!

A few final words on aligning your heads. Don't do it more than once or twice a year. The heads, once aligned properly, will stay aligned through many hundreds of hours of use. Don't believe anyone who tells you anything different.

Tangle Angles

I have built an FSK-to-Digital Translator, and am advertising it in ANTIC (June, July, August, 1983). This allows me to SAVE and LOAD tapes with my Technics M24 stereo cassette deck rather than with my 410, and after working out the kinks I have recorded 100 programs and suffered no errors. Your readers may be interested in some of my discoveries enroute.

Using my Translator, I still experienced occasional ERRORs 138, 140 and 143. I compared the digital and FSK waveforms and found they did match; therefore, the computer was somehow to blame. I checked the FSK signals (3995 hz and 5327 hz) coming from the computer and found them accurate to within 1/100 of one percent. Most of my errors were occurring at the beginning of CLOADs, so I suspected the initialization sequence.

I examined the programs I knew to be good and compared them to ones I knew were bad. On good tapes the leader signal was always 5327 hz, whereas the bad ones were a hissing combo of 3995 and 5327 hz, with the 3995 hz signal dominant. This confused the computer and apparently caused the problems. Reviewing my programming practices, I found that using [SYSTEM RESET] had caused the problems. After a [RESET], the computer seems to lose its ability to begin a CSAVE routine with clean 5327 hz.

Next I added an LED to my Translator to verify recording quality during CSAVE. Now, if you are in the process of recording and the LED indicates a bad load — you can clear the situation without turning off the computer. Press [BREAK], turn off your printer (or interface), type LPRINT [RETURN], rewind your tape and try the CSAVE again. The LPRINT clears the cassette buffer and resets the pointers correctly.

Steve Wolfe
Essence Peripheral
Atlanta, GA

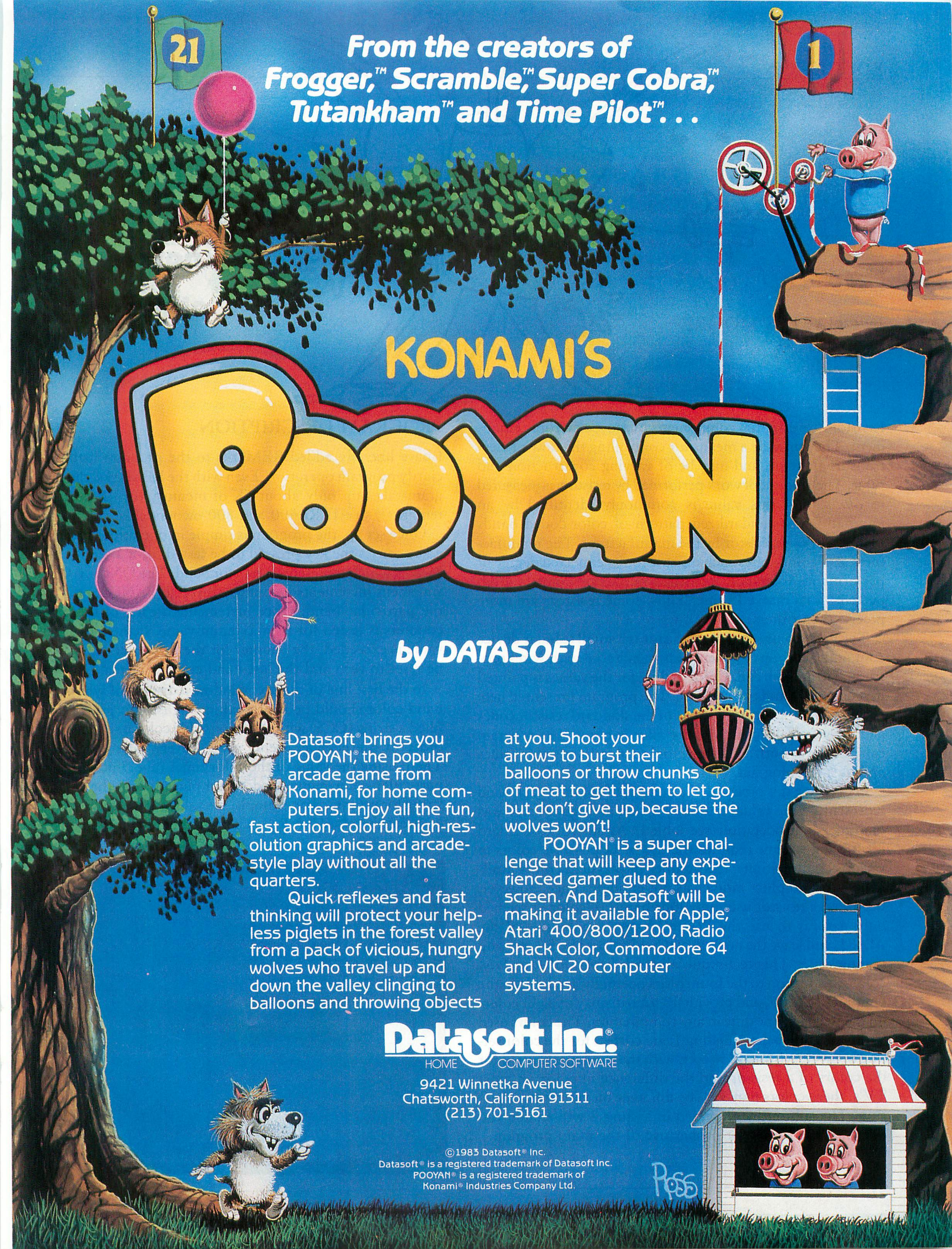
I am sure our readers will be very interested in your new FSK-to-Digital converter. The technical analysis and solutions you describe are also very interesting.

You've mentioned that no one markets an FSK to Digital Translator. I didn't want to spend another $100 for the 410 when I already owned two reasonable recorders; one stereo, the other monaural, so I designed and built my own interface. It allows me to use either a monaural or stereo player/recorder and is 410 compatible. The only restriction is that anything recorded on the audio channel interferes with the data channel when played back on a monaural, which is to be expected.

Don Larson
Denver, CO

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Color Codes for Resistors



Show me the way to know ohms

by CHARLES MOORE

Resistors are essential components of most electronic equipment. They provide a means for controlling the flow of electrons in a circuit, and may be of varying construction and value. The amount of work performed by resistors is measured in *ohms*, and this value is commonly identified by an internationally-standardized pattern of color-coded bands painted on each resistor by the manufacturer. The manufacturer also color-codes each resistor for its expected degree of performance tolerance, measured in plus-or-minus a given percent of its marked value. Thus, some resistors are more precise than others.

The most commonly seen resistor is a small tubular device containing carbon or other resistive material with wires protruding from each end. Color coding for the values is painted in sequential bands on the tube. The program presented here provides a graphic color display of the standard resistor codes and automatically computes the value in ohms. The program can be used as both a real-time tool to identify resistor values and as a learning aid.

In planning this program, the number of colors in each band representing the value (in ohms) for an average resistor was of primary consideration (see Table 1). As the world-standard identifying scheme requires the use of 12 possible colors in various combinations, the number of playfield colors available in any graphics mode was not enough. Since, however, the average resistor uses only four bands of color, it seemed only natural to use the Player/Missile capabilities of the ATARI, and leave the normal playfield colors free for text and graphics use. This technique allowed display of four P/M colors in addition to the four colors normally available in the Graphics Mode 5, and provided a total display of eight colors on the screen at one time in any combination. The colors used in the program below (Listing 1) are correct for the color setting of my television. However, with the shading required for the colors of a resistor and the difference in color on most TV's, these colors may well be different on your own television. The subroutine provided in Listing 2 will enable you to adjust the colors for proper use of the main program.

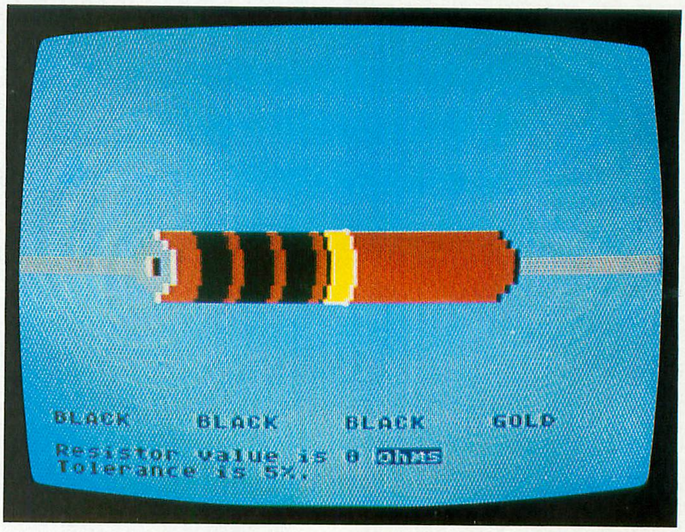
PROGRAM DESCRIPTION

I have liberally added REMarks to the program listing to clarify program operation. Even with the REMarks, the program takes up only about 5K of memory (or 4K without remarks), so ATARI 400 and 800 owners alike can use it.

Once set up, the program is simple in operation. Pressing a key causes the key pressed to be tested for a 1, 2, 3, or 4, each of which represents a resistor band. The ON . . .GOTO statement increments a counter (BAND1, BAND2, etc.) for the particular band. Once incremented, each of the band counters is tested for its maximum value. If the maximum value is exceeded, the counter for the first three bands will be reset to zero and the last band counter to ten.

In the first line of the text window a display of what each band color should be is printed in English. To print this, I filled a string (CC$) with all the possible color names in their order of precedence, evenly spaced every nine characters. Then, using the value of the color times nine, I pull out the particular color name needed and place it into the display string for printing. For example, the value for the color orange is three; therefore 3 * 9 + 1 offsets the difference in string

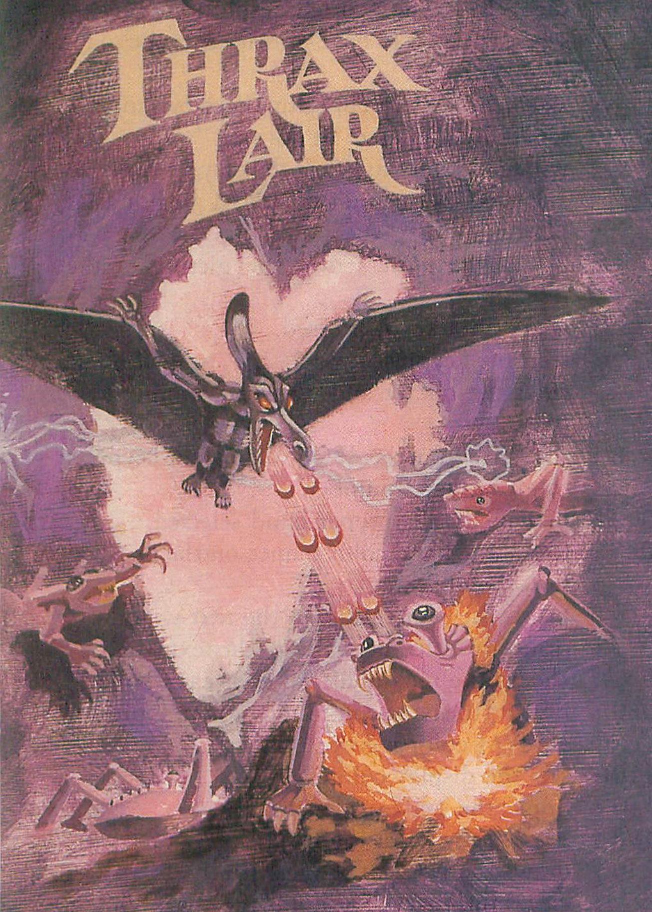
continued on page 74



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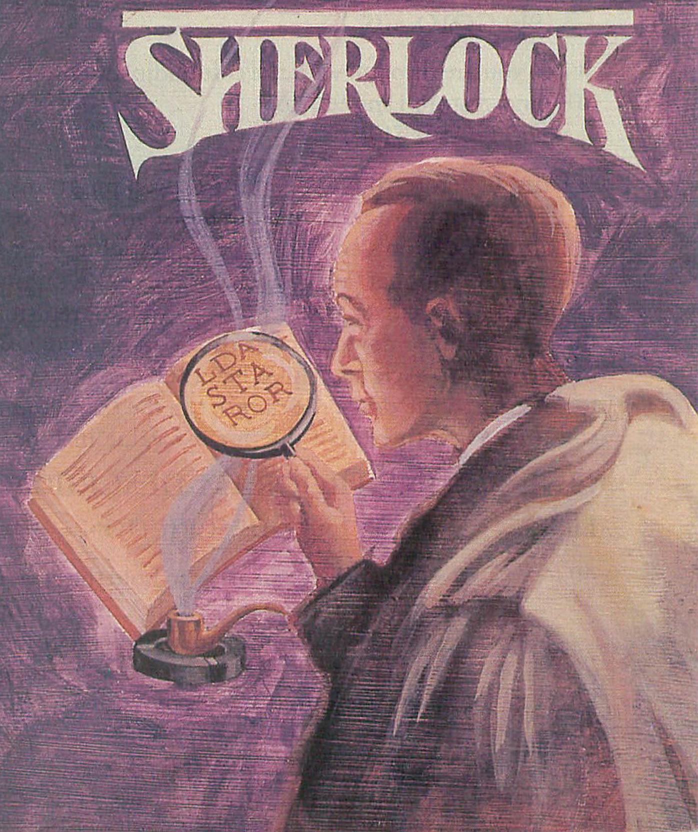
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COLOR CODES FOR RESISTORS *continued from page 72*

length and allows the word "ORANGE" to be printed by accessing the string at CC$(3*9+1,3*9+9).

The first two bands are resistor value counters, so I multiply the first band color value by ten and add the second band color value. Then, if the color value of band three is less than ten, I multiply by ten raised to the power of the value of band three. If the value of band three is ten or eleven then I multiply by 0.1 or 0.01 respectively. With this value computed, it is only necessary to adjust for the unit of measure required for display. If the value is greater than 1,000 it is expressed as "K ohms". If it is greater than 1,000,000 it is expressed in "Meg ohms". For simplicity, I allowed for only the two most common tolerance values: 5% and 10% which are represented by the gold and silver colors in band four.

ADJUSTING THE COLORS

Type in Listing 1 and SAVE it to tape or disk. In Listing 1, Line 1340 contains DATA values that determine the colors available for the bands (see Table 1). You may want to change these values so the actual color you see on your screen resembles more closely the color of the resistors. This color editing is done with Listing 2. After you type in Listing 2, LIST it to tape or disk so you can use it again if you want to.

Listing 1 and Listing 2 are used together. After Listing 2 has been LISTed, LOAD Listing 1 and ENTER Listing 2. This will merge the two programs.

Whenever you adjust the colors you must change Listing 1 as follows:

Insert Line 505 as

```
505 GOTO 5000
```

and change Line 910 to

```
910 GOTO 505
```

When you are through with the color adjustment, delete Line 505 and restore Line 910 to

```
910 GOTO 510
```

Do this before you SAVE the adjusted program.

The subroutine takes over the first band and allows you to adjust this band's color using the joystick in Port One. A color value (number) will appear in the text window corresponding to the current value of the P/M color register. Move the joystick up or down to cycle through the changes slowly, or left/right to cycle swiftly. When the band color is correct to your eye, write down the number in the text window. You can then substitute this value for my value in Line 1340.

LINE BY LINE PROGRAM DESCRIPTION

LINE		DESCRIPTION
40	:	Dimensions: an array to hold the current band values, a string to hold the current band color names, and a string to hold all the color names.
70	:	will read the band color values into the array.
90	:	sets the initial band colors.
110	:	opens the keyboard for input.
130-160	:	puts labels to the player color-register locations
200-210	:	disable the cursor and sets the graphics mode.
240	:	puts labels to the P/M location and top of RAM register.
260	:	moves the top of RAM down 16 pages and establishes the beginning address of the P/M area. This moves it below the screen memory making sure the two do not overlap.
280	:	sets P/M to the two line resolution mode.
300	:	sets all players to have priority over the playfield.
320	:	clears the P/M area by setting each byte to zero.
340	:	sets the players size to normal
370-430	:	will read values for what the players look like and POKEs them into the P/M area of each player.
450-480	:	places the players over the picture of the resistor.
520	:	waits till a key is pressed.
540	:	tests the keypress for a 1, 2, 3, or 4. If not it rings the buzzer and waits for another keypress.
550	:	subtracts from the ASCII value of the keypress to give a band number.
560-610	:	increments the proper band selected.
660-710	:	prints the band color names on the first line of text window.
750-850	:	prints the ohms value to the text window.
860-880	:	prints the tolerance value to the text window.
930-970	:	checks the maximum value of each band.
1020-1060	:	POKEs the band color values to the appropriate P/M color register.
1080-1110	:	sets the display colors.
1120-1150	:	draws the body of the resistor.
1160-1190	:	draws the end of the resistor.
1200-1240	:	draws the leads of the resistor.
1280	:	clears the string that holds the color names.
1290	:	reads the color names into CC$.

Table 1

COLOR NAME	BAND VALUE	P/M COLOR VALUE	YOUR COLOR VALUE
BLACK	0	0	________
BROWN	1	64	________
RED	2	71	________
ORANGE	3	41	________
YELLOW	4	254	________
GREEN	5	231	________
BLUE	6	147	________
VIOLET	7	117	________
GRAY	8	7	________
WHITE	9	15	________
GOLD	10	31	________
SILVER	11	11	________

continued on page 76

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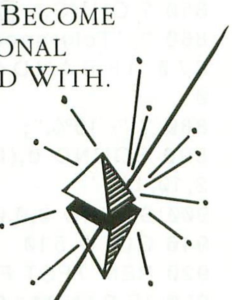
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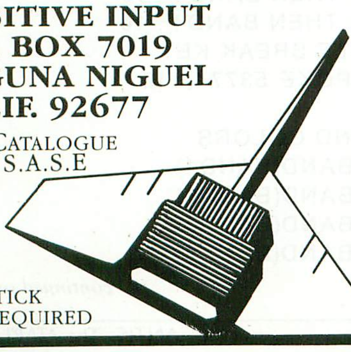
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COLOR CODES FOR RESISTORS *continued from page 74*

Listing 1

```
10 REM * RESISTOR VALUE MODEL
20 REM * BY Charles D. Moore
30 REM * use the '1 2 3 4' keys to show
40 REM * different colors for each band
50 DIM BAND(12),A$(37),CC$(108)
60 REM * LOAD BAND COLORS IN TO ARRAY
70 FOR I=0 TO 11:READ X:BAND(I)=X:NEXT I
80 REM SET INITIAL BAND COLORS
90 REM * OPEN THE KEYBOARD FOR INPUT
100 BAND1=0:BAND2=0:BAND3=0:BAND4=10
110 OPEN #1,4,0,"K:"
120 REM DEFINE COLOR REGISTERS
130 COL1=704
140 COL2=705
150 COL3=706
160 COL4=707
170 REM * BUILD STRING WITH COLORS
180 GOSUB 1280
190 REM * DISABLE THE CURSOR
200 POKE 752,1
210 GRAPHICS 5
220 REM * DRAW THE RESISTOR
230 GOSUB 1080
240 PMBASE=54279:RAMTOP=106
250 REM * ESTABLISH P/M AREA
260 A=PEEK(RAMTOP)-16:POKE PMBASE,A:PM=256*A
270 REM * SET P/M TO 2 LINE RESOLUTION
280 POKE 559,46:POKE 53277,3
290 REM * SET P/M FIELD PRIORITY
300 POKE 623,1
310 REM * CLEAR P/M AREA
320 FOR I=PM+512 TO PM+1024:POKE I,0:NEXT I
330 REM SET PLAYER SIZES
340 FOR I=0 TO 3:POKE 53256+I,0:NEXT I
350 GOSUB 1020
360 REM SET UP PLAYERS
370 VPOS=54
380 FOR I=VPOS TO VPOS+15:READ A
390 POKE PM+512+I,A
400 POKE PM+640+I,A
410 POKE PM+768+I,A
420 POKE PM+896+I,A
430 NEXT I
440 REM SET HORIZONTAL POSITIONS
450 POKE 53248,93
460 POKE 53249,103
470 POKE 53250,113
480 POKE 53251,123
490 GOTO 620:REM * SEE NOTE ON COLORS
500 REM MAIN PROGRAM STARTS HERE
510 GOSUB 1020
520 GET #1,KEE
530 REM * RING BUZZER ON WRONG KEY
540 IF KEE<49 OR KEE>52 THEN ?CHR$(253):GOTO 520
550 KEE=KEE-48
560 ON KEE GOTO 580,590,600,610
570 REM * INCREMENT BAND COLOR
580 BAND1=BAND1+1:GOTO 620
590 BAND2=BAND2+1:GOTO 620
600 BAND3=BAND3+1:GOTO 620
610 BAND4=BAND4+1
620 GOSUB 930
630 REM * CLEAR WINDOW
640 ? CHR$(125);:POKE 752,1
650 REM * ASSIGN COLOR NAMES TO WINDOW
660 A$(1)=" ":A$(37)=" ":A$(2)=A$
670 A$(1,9)=CC$(BAND1*9+1,BAND1*9+9)
680 A$(10,18)=CC$(BAND2*9+1,BAND2*9+9)
690 A$(19,27)=CC$(BAND3*9+1,BAND3*9+9)
700 A$(28,36)=CC$(BAND4*9+1,BAND4*9+9)
710 ? A$
720 REM READ BANDS
730 SOUND 0,BAND1+BAND2+BAND3+BAND4,10,14
740 POKE 752,1
750 ? :? "Resistor value is ";
760 OHMS=(BAND1*10)+BAND2
770 IF BAND3>9 THEN 830
780 OHMS=OHMS*(10^BAND3)
790 OHMS=INT(OHMS+0.5)
800 IF OHMS<1000 THEN ? OHMS;"    ohms":GOTO 860
810 IF OHMS<1000000 THEN OHMS=OHMS/1000:? OHMS;" K ohms":GOTO 860
820 OHMS=INT(OHMS/1000000):? OHMS;" Meg ohms":GOTO 860
830 IF BAND3=10 THEN OHMS=OHMS*0.1:GOTO 850
840 OHMS=OHMS*0.01
850 ? OHMS;" ohms"
860 ? "Tolerance is";
870 IF BAND4=10 THEN ? " 5%.";:GOTO 900
880 ? " 10%.";
890 SOUND 0,(BAND1+BAND2+BAND3+BAND4)*2,10,14
900 SOUND 0,0,0,0
910 GOTO 510
920 REM TEST FOR BAND MAX
930 IF BAND1>9 THEN BAND1=0
940 IF BAND2>9 THEN BAND2=0
950 IF BAND3>11 THEN BAND3=0
960 IF BAND4>11 THEN BAND4=10
970 IF BAND4<10 THEN BAND4=10
980 REM * DISABLE BREAK KEY
990 POKE 16,112:POKE 53774,112
1000 RETURN
1010 REM SET BAND COLORS
1020 POKE COL1,BAND(BAND1)
1030 POKE COL2,BAND(BAND2)
1040 POKE COL3,BAND(BAND3)
1050 POKE COL4,BAND(BAND4)
```

continued on page 78

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EDUCATIONAL SOFTWARE INC. 4565 Cherryvale Ave. Soquel, CA 95073

COLOR CODES FOR RESISTORS *continued from page 76*

```
1060 RETURN
1070 REM DRAW RESISTOR
1080 SETCOLOR 1,3,2
1090 SETCOLOR 4,9,14
1100 SETCOLOR 2,9,14
1110 SETCOLOR 0,0,12
1120 COLOR 2
1130 FOR I=1 TO 8:READ A
1140 PLOT 20-A,18+I:DRAWTO 60-A,18+I
1150 NEXT I
1160 COLOR 1
1170 FOR I=1 TO 8:READ A
1180 PLOT 17-A,18+I:DRAWTO 17+A,18+I
1190 NEXT I
1200 COLOR 2:PLOT 17,22:PLOT 17,23
1210 COLOR 1:PLOT 0,22:DRAWTO 16,22
1220 PLOT 0,23:DRAWTO 16,23
1230 PLOT 61,22:DRAWTO 79,22
1240 PLOT 61,23:DRAWTO 79,23
1250 RETURN
1260 REM DEFINE COLOR STRING
1270 REM * CLEAR STRING FOR COLOR NAME
1280 CC$(1)=" ":CC$(108)=" ":CC$(2)=CC
$
1290 FOR I=0 TO 11
1300 READ A$
1310 CC$(I*9+1,I*9+LEN(A$)+1)=A$
1320 NEXT I
1330 RETURN
1340 DATA 0,64,71,41,254,231,147,117,7
,15,31,11
1350 REM * COLORS FOR WINDOW
1360 DATA BLACK,BROWN,RED,ORANGE,YELLO
W,GREEN
1370 DATA BLUE,VIOLET,GRAY,WHITE,GOLD,
SILVER
1380 DATA 2,1,0,0,0,0,1,2
1390 DATA 0,1,2,2,2,2,1,0
1400 REM * PLAYER DATA
1410 DATA 252,126,126,126,63,63,63,63,
63,63,63,63,126,126,126,252
```

TYPO TABLE

Variable checksum = 591309

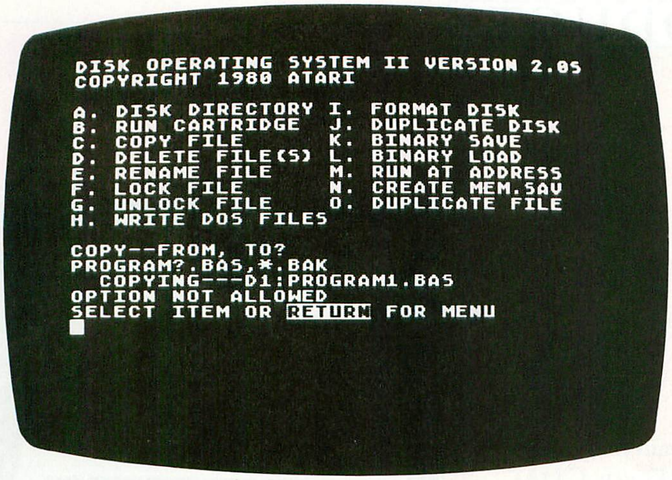
Line num range	Code	Length
10 - 120	LY	423
130 - 240	BR	230
250 - 360	JG	359
370 - 480	NW	235
490 - 600	CP	340
610 - 720	SW	448
730 - 840	UZ	365
850 - 960	JM	313
970 -1080	PG	220
1090 -1200	HK	324
1210 -1320	UK	372
1330 -1410	GI	277

Listing 2

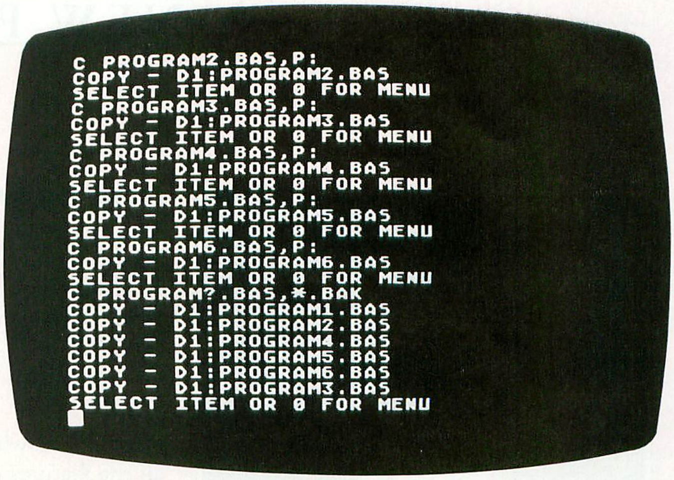
```
5000 REM SUBROUTINE TO FIND COLORS
5010 REM * USE THIS TO ADJUST COLORS
5020 REM * TO YOUR MONITOR OR TV
5030 REM * INSERT LINE "505 GOTO 5000"
5040 REM * PLACE NEW VALUES IN BAND(A)
5050 GOSUB 1020
5060 REM * UP/DOWN FOR SMALL CHANGE
5070 REM * LEFT/RIGHT FOR LARGE CHANGE
5080 REM * BUTTON FOR EXTRA BIG CHANGE
5090 REM * VALUE FOR COLOR WILL APPEAR
5100 REM * IN THE WINDOW
5110 ? "⬉"
5120 S=STICK(0)
5130 IF STRIG(0)=0 THEN BC=BC+50:GOTO 5190
5140 IF S=15 THEN 5120
5150 IF S=14 THEN BC=BC+1
5160 IF S=13 THEN BC=BC-1
5170 IF S=11 THEN BC=BC+10
5180 IF S=7 THEN BC=BC-10
5190 IF BC<0 THEN BC=255
5200 IF BC>255 THEN BC=0
5210 POKE COL1,BC
5220 ? :? :? BC
5230 GOTO 5120
```

ATARI DOS 2.0S

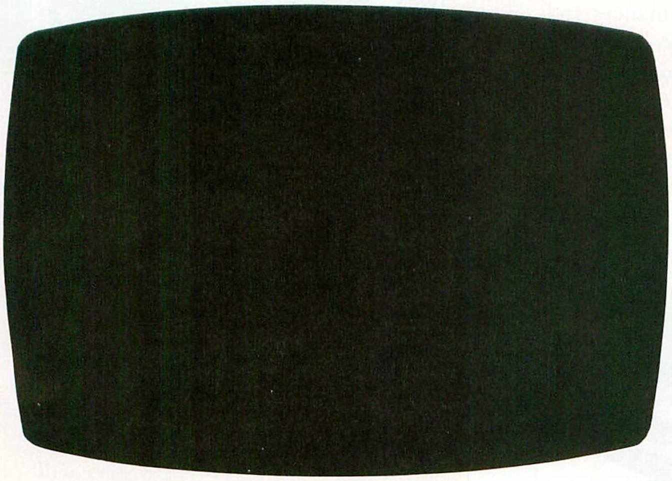
DOS-MOD



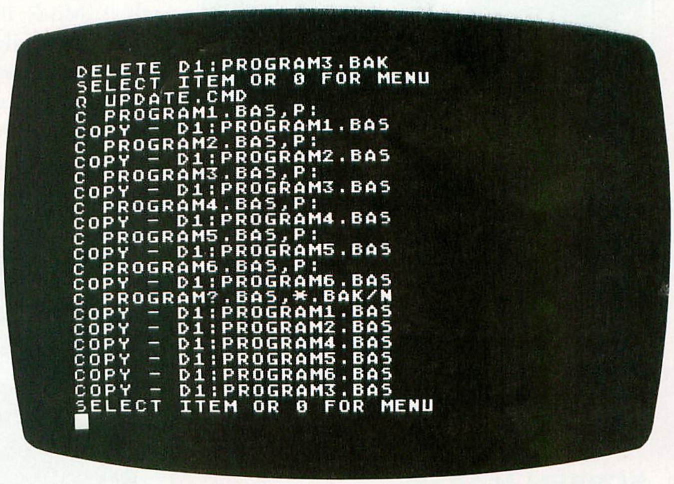
Six Lines of Work Space



Twenty-Four Lines of Work Space



None



Command Files

Upgrade your ATARI DOS 2.0S with the modifications, enhancements, and new features of DOS-MOD.

DOS-MOD makes ATARI DOS an even more useful operating system, yet it is completely compatible with all your exisiting programs. DOS-MOD has features you would expect to find in more sophisticated systems. Compare them and see.

FULL SCREEN USE. DOS-MOD allows you four times more workspace on your screen. One-line commands and queries, a compressed menu, and a minimum of screen-clearing lets you see more of what you've been doing.

COMMAND FILES. Execute a whole sequence of commands in one easy operation. DOS-MOD's new commands and expanded functions give you a more powerful system.

EXPANDED WILDCARD CAPABILITY. In DOS-MOD, the wildcard conventions are more general and provide you greater control over COPY, DELETE, and RENAME operations.

BUGS ELIMINATED. Eleven bugs in ATARI DOS 2.0S have been fixed. And the BREAK instruction has been trapped, facilitating recovery when your program gets lost.

FRIENDLY TUTORIAL. DOS-MOD's on-screen interactive tutorial helps you learn the features and uses of ATARI DOS and DOS-MOD.

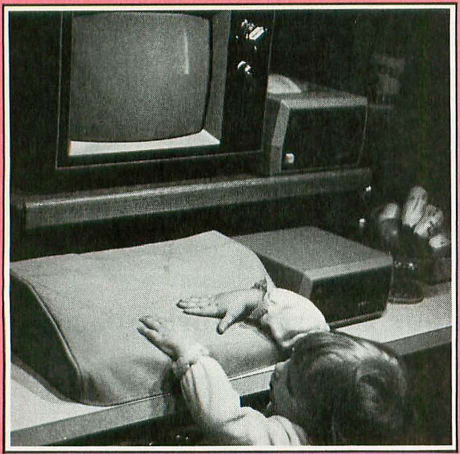
GREAT PRICE. NO RISK. Only $35 includes diskette with tutorial. DOS-MOD is guaranteed to make your ATARI DOS a more useful tool, or you may return it within 30 days for a full refund.

A double density version of DOS-MOD is available. Call or write for more information.

Order your DOS-MOD today. Send a check or money order to Eclipse Software, 1058-A Marigold Court, Sunnyvale, California 94086. Or call (408) 246-8325.

ECLIPSE SOFTWARE

ATARI is a registered trademark of Atari, Inc. DOS-MOD is a trademark of Eclipse Software. Prices are subject to change. We pay shipping charges. California residents add 6.5% sales tax ($2.28). C.O.D. orders accepted by phone—add $1.50.



COMPUTER CAP

(protective device)
Computer Cap, Inc.
P.O. Box 7
Columbus, IN 47202
(812) 926-3227
$12.95

This static-free, easy-to-clean, vinyl-welted canvas cover protects your 400 or 800 (two sizes) from dust, spills and harmful pollutants.

SCREEN MAKER

(graphics utility)
ICON Software
925 Waverly St., #102
Palo Alto, CA 94301
48K—diskette
$34.95

This BASIC utility program allows you to combine up to 15 different graphics modes on your screen. It enables you to create the necessary display lists, handle messy memory management requirements and print out easy-to-use subroutines for your own programs.

AMPLOT II

(six-color plotter)
Amdek Corporation
2201 Lively Blvd.
Elk Grove, IL 60007
(312) 364-1180
$1290.00

This six-color plotter features high pen speed, automatic pen retrieval and .002" resolution for fast, accurate plots. Effective plotting range is 10"× 14". Six fiber tip pens are furnished.

GTIA DRAW

(graphics utility)
Sar-An Computer Products
12 Scamridge Curve
Williamsville, NY 14221
(716) 632-3441
8K—cartridge
$49.95

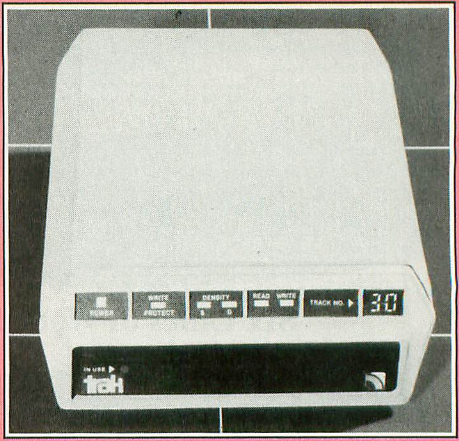
Here is a drawing program that utilizes all the features of ATARI's new GTIA chip. It gives you three extra graphics modes: Mode 9 (16 luminances and one color), Mode 10 (8 luminances and color), or Mode 11 (16 colors and one luminance). You can produce hi-resolution pictures, charts or graphs. It also adds text to pictures and "zooms" in on portions of a picture.



SLAGER SYSTEM PERSONAL COMPUTER DESK

(computer desk)
O/I, Inc.
1314 S. Main
Elkhart, IN 46515
(219) 522-3498
$240.00

Discover greater productivity and fewer health problems with this adjustable computer table designed by Tom Slager. It has extra-large, hook-on worksurfaces that can be raised or lowered in this compact, expandable unit.



AT-D1 and AT-D2

(disk drives)
Trak Microcomputer Corporation
1511 Ogden Ave.
Downers Grove, IL 60515
(312) 968-1716
$469.00 (single density)
$499.00 (double density)

These two new intelligent drive systems — single and double density — feature an on-board microprocessor and programmed memory, and they're only 3" high! Any Centronics-type printer will plug directly into the drive, eliminating the need for an interface. A digital track counter tells you where every bit of data is located.

HOME ENERGY APPLICATIONS ON YOUR PERSONAL COMPUTER

(book)
by David E. Pitts
COMPUTE! Books
P.O. Box 5406
Greensboro, NC 27403
250 pages
$14.95

If you find yourself caught in the crunch of spiraling utility bills, this book may be able to help you. Track and analyze your utility costs and make wise investments in home improvements with its expert advice. Every geographic area in mainland U.S.A. is covered.

NEW PRODUCTS

FOOT-CRAZ
(game controller)
Exersoft Corporation
333 Escuela Ave., Suite 340
Mountain View, CA 94040
(415) 969-8487
$69.95 (includes STOMP game)

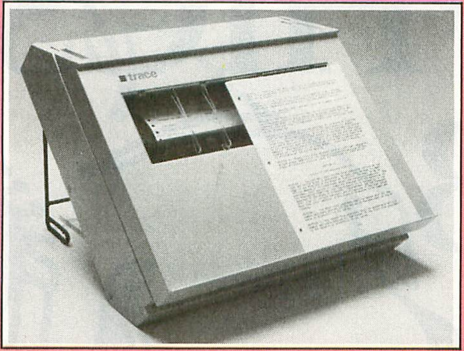
A foam floor pad that acts like a joystick, this unique controller enables you to exercise and improve eye-foot coordination. You press different color dots with your foot and you're off! Two games — Stomp and Jogger — have been designed especially for use with it and are also sold separately.

POO YAN
(game)
Datasoft, Inc.
9421 Winnetka Ave.
Chatsworth, CA 91311
(213) 701-5161
32K—diskette and cassette
(sold together in both media)
$34.95

An exciting new arcade game, Poo Yan (which means "piglet" in Japanese) combines color graphics with fast action. It requires quick reflexes and fast thinking as you battle a pack of vicious, hungry wolves to protect the helpless piglets roaming the forest.

THE ALOG PAGEWRITER
(word processor)
Alog Computing
1040 Veronica Springs Road
Santa Barbara, CA 93105
(805) 964-4660
32K—diskette
80 column printer, 850 interface
$39.95

A simple word processor, this program turns your ATARI into an electronic typewriter. The entire page layout is displayed while you type and edit. In just five minutes you can begin using it to write letters, memos or term papers. Features a help screen with command summary.



SOUND TRAP
(sound muffler)
Trace Systems, Inc.
1928 Old Middlefield Way
Mountain View, CA 94043
(800) 24-TRACE
In Calif. call collect (415) 964-3115
$129.00—with stand
$109.00—without stand

Does a noisy printer interfere with your telephone conversations? This acoustical housing hushes printer noise, occupies little space, stores paper and makes fan folding easy. The optional stand transforms it into a data holder or copy stand. Decibel ratings are also available.

NO ZAP
(voltage regulator)
KIS Engineering
10D College Lane
Methuen, MA 01844
$12.95 plus $2.00 postage and handling

Keep static electricity from causing you uncomfortable shock or crashing your computer system. To save you or your ATARI from getting "zapped", install this small inexpensive peripheral next to your keyboard.

POCKET CALC
(hexadecimal to decimal conversion table)
Micro Works
9898 Summit Rd.
Newark, OH 43055
$2.50

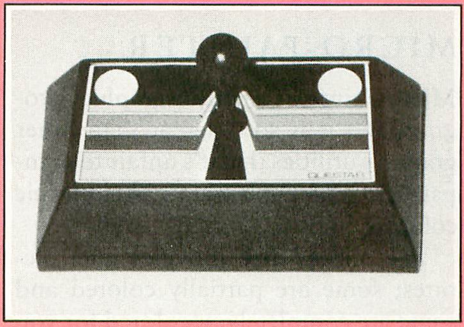
Here is a pocket-size slide rule type calculator which helps you convert easily from hexadecimal numbers to decimal numbers or vice versa. New ATARI users as well as experienced programmers will find this item handy for BASIC and assembly language programming.

FANCY WRITER
(graphics utility)
Kidstuff Software
3736 Ferndale
Ft. Wayne, IN 46815
(219) 485-2923
24K—diskette
$34.95

Would you like to print out text in a new type style like Old English, Cursive or Small Baby Teeth? With Fancy Writer you can create five new alphabet styles, utilizing the graphics capabilities of the Epson (with Graftrax), NEC or Prowriter printers.

DEVIL'S DARE
(game)
The Jay Gee Programming Company
7185 Blue Hill Drive
San Jose, CA 95129
(408) 257-7795
16K—diskette
$19.95 plus $3.00 shipping

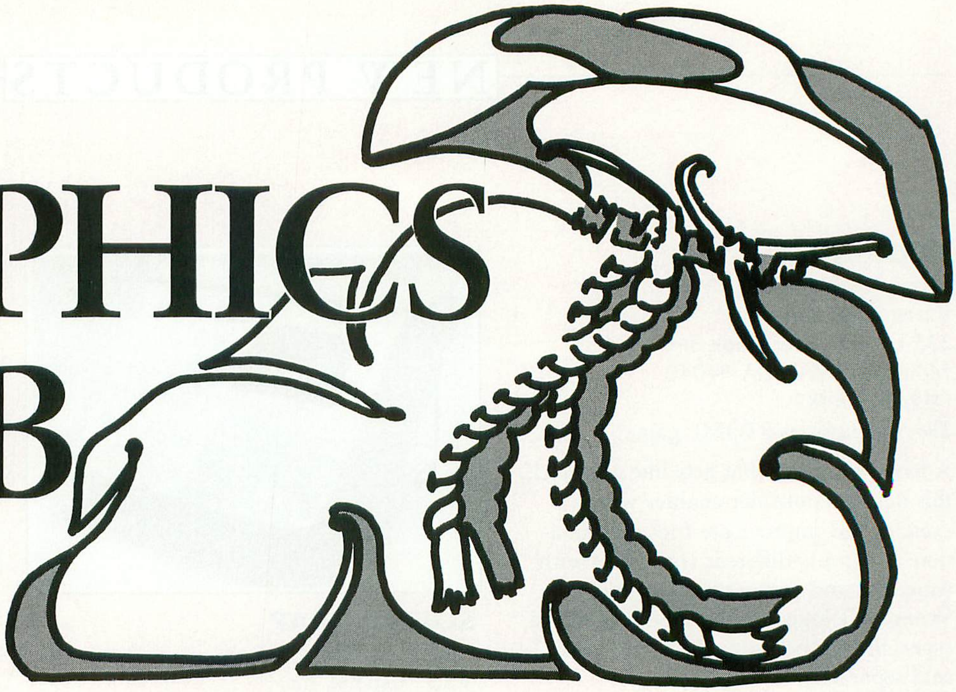
One to four players race against time on a colorful checkerboard to beat the "devil's dare." In a special one-time offer, Jay Gee will send your money back if you can beat the game within the first ten days of purchase. This offer expires October 31, 1983.



QUESTAR II
(game controller)
670 N.W. Pennsylvania Ave.
Chehalis, WA 98532
(206) 748-8614

Now you can experience the exact feel of a coin-op arcade game at home. This game console is bigger than usual (12½"× 8") because it's built with full size arcade components. Players find response time faster and the button controller more comfortable for long use.

GRAPHICS GRAB BAG



The ATARI computer is well known for its outstanding graphics capabilities, and excellent graphics software is available for even the beginner to use. You could spend weeks programming your own pictures, but with the help of the following programs you can start producing colorful graphics right now. Anyone can become an artist by using Micro Painter, Graphics Master, Graphics Composer, Paint, Drawpic or Stereo 3-D Graphics.

MICRO-PAINTER

Micro-Painter is a unique graphics program and it is so different than other graphics utilities that it's unfair to compare it to others. It is mainly an electronic coloring book.

The master disk provides nine pictures; some are partially colored and some are completely uncolored for you to fill in. It works faster than most programs, and with a wider variety of colors, because it is written in machine language.

You can color the provided pictures, then save them on a different disk. This way everyone in the family can color the same picture several times. DataSoft promises to provide more new pictures to be colored in the near future.

When you have mastered painting in the forms provided you can begin to create your own. The strange but useful "rubber band mode" lets you see the lines you are drawing before you actually place them on the screen. By pressing the spacebar, you can get a "microscope mode" — zoom view of a part of the screen — and scroll the view around the screen for accurate drawing of tiny characters or objects. You can save your pictures to disk.

My only disappointment in Micro-Painter is that it does not generate circles. It also does not send your pictures to a printer. Other than these missing features, I rank this utility very high.

—Ralph Iskaros

GRAPHICS MASTER

Another graphics utility from DataSoft, this is the most recently released and may rate even higher than Micro-Painter. Graphics Master is the most complete graphics utility on the market today and I cannot imagine improving upon it in any way. Although the software is written in BASIC, you will never notice because it has none of the problems of other programs written in BASIC.

In this utility there are many different commands (30 commands on the Quick Reference Card alone), and you alternate between the two screens which are in memory at the same time. With the [SELECT] key you move from one screen to another and can overlay patterns by moving objects from one part of the screen to another or onto the opposite screen.

I especially like this program because I can easily draw circles and various other shapes or apply text of different fonts or sizes. Graphics Master is ideal for designing layouts, compositions and graphics. You can save all your creations to disk or print them out on an Epson printer with Graftrax. If you have a NEC 8023-A printer, DataSoft includes a version of the program to be used with it.

—Ralph Iskaros

GRAPHICS COMPOSER

This program was originally produced for use on the Apple and you had to use it with a $300 graphics tablet. Versa Computing has made it available for ATARI users without this expensive tablet and it was one of the first quality graphics packages. It is still one of the best graphics utilities on the market.

Graphics Composer is a collection of three different programs that allow you to create pictures in high resolution (320

continued on page 84

 continued from page 82

NAME	GRAPHICS COMPOSER	MICRO PAINTER	GRAPHICS MASTER	PAINT	DRAWPIC	STEREO 3-D GRAPHICS
Manufacturer	Versa Computing	DataSoft	DataSoft	Reston	Artworx	APX
Media	Disk/Tape	Disk	Disk	Disk	Disk/Tape	Disk
Ram Required	32K	48K	40K	48K	24K—Disk, 16K—Tape	32K
List Price	$39.95	$34.95	$39.95	$49.95	$33.95, $29.95	$24.95
Documentation	Excellent	Good	Excellent	Excellent	Good	Good
Language	BASIC	Machine	BASIC	Machine	BASIC/Machine	BASIC
Program Speed	Medium	Very Fast	Fast	Very Fast	Very Fast	Slow
P/M Generator	Yes	No	No	No	Yes	No
Add Text to Pic	Yes	No	Yes[1]	No	Yes	N/A
Load Modified Font	Yes[2]	No	Yes	No	Yes	N/A
User Modified	Yes	No	No	No	Yes	N/A
Rubber Band Mode	No	Yes	No	No	Yes	N/A
Geo. Shape Maker	Yes	No	Yes	Yes	Yes	N/A
Zoom View	No	Yes	Yes	Two	Yes	Yes
Editing Errors	Easy	Medium	Easy	Easy	Medium	Medium
Fill Command	Slow	Very Fast	Fast	Very Fast	Fast	N/A

(1) Choose or mix from 3 text sizes (2) Various fonts supplied with disk

by 192 resolution points), medium resolution (160 by 96), and has a special program to create and modify Player/Missile graphics. You can also add text of different fonts to the pictures and generate geometric shapes. The third program is especially useful for creating circles and arcs that are impossible to do with a joystick. Like Micro-Painter, you can store your drawing to disk but cannot send it to a printer. —*Ralph Iskaros*

PAINT

This graphics utility is an artistic triumph. It is easy to use yet has extensive capability for graphics expression. It is an elegant and intuitive program from a "human-computer engineering" viewpoint.

Paint works by having you point to a menu option with your cursor and/or by simple one- or two-keystroke key entries. The keystrokes are excellent mnemonics — [B] for brush, [W] for width of brush, [C] for color, etc. This dual mode allows an artist to choose the stroke that suits the need.

After booting Paint, you have a blank "canvas" and nine "pots" of paint with different colors and textures. You move the "brush" (a cursor) over the canvas with a joystick. Brushes are available in nine different shapes in nine different sizes. The four solid colors can be mixed from any of 128 different colors/shades.

A special zoom command magnifies your pictures in two steps to let you work dot-by-dot. The entire screen scrolls, creating dazzling effects as the pattern colors scroll by.

Although the program is excellent, it is not without its flaws. New GTIA modes, which allow three-dimensional shading, are not supported. Also, the boundaries of some of the colors "bleed" into one another. While this produces interesting effects, it may not be what you wanted in your drawing.

—*Ken Harms*

DRAWPIC

The updated version of this graphics utility includes many features that the original lacked. Drawpic has always made it possible for BASIC programmers to draw and animate full-color images, but it is now even more powerful.

The software now has full-screen graphics so you can eliminate the text window for a full-screen picture. You can also store pictures directly onto disk without intermediate string storage, which saves memory. It redefines character sets now, too.

Drawpic is menu-driven and requires one joystick. You can use any graphics mode from 3 to 7, and set the colors using the joystick. Since using BASIC to draw animated characters is too slow, the program has relocatable assembly language subroutines to put your images on the screen fast.

The commands for drawing a picture are Plot Point, Draw Line, and Rubber Band. Rubber Band is unusual in that it causes a constantly updated line to be drawn between the starting point and the cursor.

If you already own an early version of Drawpic, you can exchange it for the "new, improved" version for a nominal charge. The extra added features may well be worth it. —*Dave Plotkin*

STEREO 3-D GRAPHICS

This program is not a drawing program, unlike the others mentioned above, but it offers unique graphics features that you may find valuable.

The "stereo" in the title refers to the fact that this program will generate two views of the object at once to get a true stereo effect. You can also photograph your TV screen to make double photographs that can be viewed with stereo glasses.

This APX program will draw in Graphics Mode 7 or 8, but it doesn't use artifact colors in GR.8. Since it is written in BASIC, it runs more slowly than the other programs. But it also lets you draw just a single image of an object. In this mode, you can choose an angle of view to generate perspective effects from ultra-wide-angle to telephoto. Working with lettering and grid patterns, you can create title effects like Star Wars lettering zooming off into space. Utility programs within the programs help enter data for objects and contour maps. With one of these utilities you can create a digitized picture by using game paddles with an overlay on the screen.

—*Jerome O'Neill*

MAPMAKER

APX (Atari Program Exchange)
P.O. Box 3705
Santa Clara, CA 95055
(408) 727-5603
$24.95, 32K–diskette

Reviewed by Clyde Spencer

Mapmaker is an impressive program written by Stephen Hall to create multi-screen scrolling maps similar to the classic Eastern Front (1941). It is written in BASIC with machine language subroutines and is menu-driven and relatively easy to use, once you master the concepts involved. However, that means spending some time reading and probably re-reading the manual. To obtain maximum usefulness from it, you should get a character generator program as well. Recommended character generators are Instedit from APX or Fontedit from Code Works.

The minimum size map you may make is 22 × 13 characters (just slightly larger than the usual graphics mode 2 + 16 screen). The maximum size map varies with the amount of memory available in your computer. If you have a full 48K RAM, as do all the new ATARI 800's, you can make a map with a maximum of 128 characters horizontally and a maximum of 255 vertically, for a total display area of over 34 screens (the product of horizontal characters by vertical characters cannot exceed 8192). The completed map may consist of up to 64 different symbols or lines in any of four different colors on a fifth background color.

While the author states that the program was originally written to help him create war games, this all-purpose character set with tanks, swastika and maltese cross seems to be better suited to re-writing Eastern Front (1941) than creating arbitrary maps or general (pardon the pun) war games. It might have been appreciated by most users if several different symbol files had been provided with Mapmaker. There could have been one with fractal shapes for boundaries, standard cartographic symbols for geographers, one for war games, and one for urban planimetric maps for urban-planners and city administrators.

It would seem as though the author had originally intended to be able to call up a character editor from within the program and, either never finished the editor, or was asked to delete it. He hints at how one might go about installing an editor. You are therefore required to purchase or write a character editor to create map symbols different than those provided.

Those who are used to Eastern Front (1941) may be a little disappointed. The cursor does not move as smoothly, and the scrolling is not automatic, but is invoked by holding down the joystick trigger button. It is also possible to move the cursor right off the visible map. To my surprise, however, the cursor will come back to the edge automatically when you let up on the joystick button!

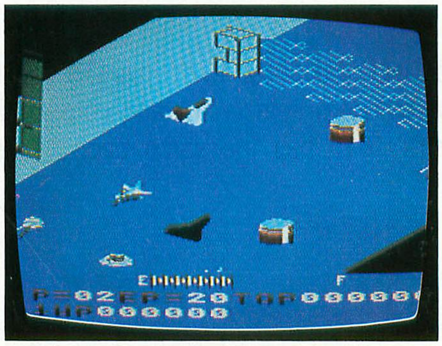
The program can use either joystick or keyboard input, so in the unlikely event that you don't already own a joystick, you won't have to rush right out and buy one. Since it is necessary to press [START] and move the cursor for every character entered, I personally found it more convenient to use the keyboard arrow keys rather than the joystick.

The demonstration map (50 × 46) included with the package is a map that looks somewhat like Eastern Front (1941). It has a large landmass on the right side of the map and ocean on the left, and has mountains, trees, rivers, and special symbols indicating various war machines. The cursor X&Y coordinates on the screen were virtually unreadable in the black default colors. Fortunately, pressing [SELECT] will alternately either remove the cursor position information or change it to white, which is more legible for the background colors supplied.

This program works smoothly and without major problems. There is a minor problem with restarting or going to DOS without first pressing [SYSTEM RESET]. Also, one cannot save maps when using an Axlon RAMDISK™ as I had tried. The problem may have been the result of a page six conflict with my BASIC/XA appended to the RAMDISK boot file.

The maps are, at best, only useable as demonstrations to your friends and family. Without a public-domain map-loader and scroller with specific instructions on how to implement them, you have to be as good a programmer as the author to use your finished maps in any other software you might write. It seems to me then, it defeats the purpose of providing an easy to use tool for the uninitiated.

PRODUCT REVIEWS



ZAXXON

DataSoft, Inc.
9421 Winnetka Ave.
Chatsworth, CA 91311
(213) 701-5161
$39.95, 16K & 32K—diskette
(both versions on same diskette)
$39.95, 16K—cassette

Reviewed by Marc Benioff

Long ago, in a world in a galaxy far, far away, stood a floating fortress. It was the most protected stronghold in the universe. This base was used for protecting one powerful entity — the deadly robot Zaxxon.

In the new home computer version, as in the arcade game, also called Zaxxon, you attempt to penetrate this fortress and destroy the robot. As the game begins, you are flying your aircraft in outer space. Within a few seconds you approach the outer wall of this protective base. It just so happens that there is a small opening for a ship that's just your size.

As you enter the base you see missiles, lasers, and fuel dumps everywhere. Your first goal is to destroy all these objects. As you begin the destruction you must be careful to avoid enemy fire. In turn, the pilot must try to secure more fuel by destroying the fuel dumps. If you fail to annihilate the fuel dumps, you will crash from lack of fuel. As you leave this enemy base, it appears that you have missed the robot. But the fact is, you will not encounter Zaxxon until you reach another level of play.

While leaving this first level you must shoot down the many enemy planes that attempt to attack you. You will be admitted to the second level only after successfully battling these planes.

At the second base you will find the laser walls which must be conquered. To survive these walls, you have to fly in-between the openings that appear on them. When you finally maneuver through these walls, you will come face to face with Zaxxon.

When fighting this mighty robot, you must be extremely careful. It only takes one hit from Zaxxon to destroy you, and six shots for you to destroy it. But if you destroy it first, the game will continue on at a higher level of difficulty.

The playfield of this game is a diagonally scrolling blue field. Within this field you see the missiles, lasers and assorted battle machinery. These graphics are extremely well done, and give a full three-dimensional look and feel to the game.

The sound effects in Zaxxon are also very good. As you fly through the bases, you hear the engine sounds of the plane. When you destroy the objects on the ground, you hear the resultant explosions. When you shoot at enemy tanks and missiles, you hear the distinct sound of laser fire.

Overall, I would say Zaxxon compares quite well with the original arcade version. I cannot recommend it as "excellent", however, for several reasons. I was a bit disappointed with the lack of "feel" (i.e., response and power) in controlling the aircraft, and the sound effects were less than spectacular. But for the amount of memory they had to work with, perhaps this is the best that Datasoft could do.

ANTIC readers should know that the disk version of the game can be used on a computer that has either 16K or 32K in memory. If your ATARI only has 16K, you will get the basic game that will be missing just a few features. The 32K version also has a pause feature and the base missiles, and you can move the aircraft up and down as well as from left to right.

FT. APOCALYPSE

Synapse Software
5221 Central Ave., #200
Richmond, CA 94804
(415) 527-7751
$34.95, 32K — cassette or diskette
$34.95, 16K — cartridge

Reviewed by Roy D. Wolford

A warning sounds and a signal flashes on the screen — "Low on Fuel". You must land your Rocket Copter on the fueling platform, load 2000 units of fuel and get ready to descend into the depths of the belligerent Kralthans' underworld. Your aim is to rescue 16 compatriots held captive in subterranean caverns filled with insidiously fiendish weaponry.

Before your mission is completed in **Ft. Apocalypse**, you will have blasted your way into the Vaults of the Draconis, rescued eight men on two levels of caverns, maneuvered your way through electronic walls (impact shields), Hyper-Chambers with glowing nodes and Rotating Field Envelopes with rotating energy blocks. Descending through a portal into the Crystalline Caves you will have to rescue eight more men, destroy the dreaded Ft. Apocalypse, then ascend to freedom. Through all the levels, you must be skillful enough to avoid or destroy Kralthans' tanks, missile drones, Robo-Choppers, Self-Propelled Mines (SPMs) and Laser-Chambers.

Points are awarded for each piece of the Kralthans' arsenal you destroy except for the Robo-Choppers. For each SPM destroyed, 50 points are awarded; 10 points for each missile drone destroyed or avoided; 250 points for each tank; 20 points for each door or crystalline block and 9999 points for destroying Fort Apocalypse. For each prisoner rescued, 800 points are awarded, but only 20 points are awarded if they are hit by one of your Plasma-Bombs or Interceptor Rockets.



Bonus points are awarded upon entering each major level of the Kralthans' Chambers.

The number of points awarded is based on the time required to complete each phase of the mission. A maximum of 9999 points are awarded. For each second that elapses, 7.5 bonus points are deducted. To increase the difficulty of your rescue mission fuel is consumed at a rate of 240 units per minute and you must deal with gravitational forces. If your fuel runs out or gravity pulls you into the ground, you lose one Copter. A refueling station is located at the entrance of the Crystalline Caves.

The game has three selectable options that give 27 different combinations of skill levels. The three options are Gravity Skill, Pilot Skill and Robo-Pilots (Number of Jet-Copters). Using the select key you can choose the Gravity Skill difficulty — weak, normal or strong. The Pilot Skill options are novice, pro or expert and you may choose 7, 9, or 11 Copters with the Robo-Pilots option. The first skill level under each option is the default value.

Ft. Apocalypse is played by one person who uses the joystick to maneuver the Rocket Copter through the playfields. The Copter's response to the joystick is excellent. Pulling the joystick toward you causes the Copter to descend, pushing it forward causes the Copter to ascend, hard left and hard right move the Copter from side to side. A slight touch of the joystick in the opposite direction the Copter is facing will cause the Copter to face forward. In this position Plasma-Bombs can be released, which fall vertically when the firebutton is pressed. Pressing the firebutton while the Copter is facing left or right or inclined from the horizontal position during flight, will launch interceptor rockets.

Some of the features that enhance the game's action are the wrap-around scrolling, the teleporting of your Copter after being zapped in the Hyper-Chamber, the Navatron, the landing pads and the space bar. The wrap-around scrolling enhances the game's playability while the teleporting adds an element of risk and uncertainty because you may materialize in a chamber with choppers or SBMs. The Navatron provides a long range navigational view of the surrounding space. The landing pads provide a feature which permits you to land your Copter at particular locations within the caves, and be returned to that location in the event your Copter is destroyed. You can take a brief rest by pressing the space bar which suspends the action. Pressing it again resumes the action.

The graphics are excellent with good resolution and vivid color combinations of red, blue, green, yellow, black and white. The game is fun to play and has lots of action and good sound effects.

The only features that detracted from the game were the sound of the Copter and the requirement to repeatedly press the firebutton to blast away the crystalline blocks in the Crystalline Caves. During hovering, the Copter sounds like someone walking in wet shoes. While in the Crystalline Cave phase of the game, the need to rapidly repeat the pressing of the firebutton becomes tiresome. The game could be improved by having an autofiring option for the rockets and bombs.

continued on next page

Although the main theme of Ft. Apocalypse is a copter rescue mission, this is not a clone of Choplifter by Broderbund Software. The action is much more varied and dynamic. The skill level can also be varied which makes the game much more fun for a beginner to play and will hold the interest and challenge of the player whose skill has grown with much practice.

PM ANIMATOR

Don't Ask Software
2265 Westwood Blvd., Suite B-150
Los Angeles, CA 90064
(213) 397-8811
$34.95, 32K—diskette

Reviewed by David Duberman

Player/Missile graphics is one of the ATARI's most powerful yet mysterious features. Programmer Roger Bush and the innovative folks at Don't Ask have performed a real service for the Atari community in bringing us PM Animator. Using the tools and techniques made available by this package, you can create animated figures and easily incorporate them in your own programs.

Beginners please take note: although PM Animator contains an extensive tutorial on the subject, you should probably have some understanding of programming in BASIC in order to be able to fully grasp the material.

This most complete package offers two editors, eight BASIC demo programs, an exhaustive tutorial, and a LISTed BASIC routine — TOTAL.LST — that you can ENTER into your own programs.

If you don't know a Player/Missile from a character set, the documentation includes the most complete tutorial ever printed on the subject in one place. The first five chapters are expressly designed to teach the basics of this admittedly complex subject to someone with absolutely no knowledge of the principles of computer graphics. The central portion of this 80-page manual describes in great detail the various features of PM Animator. The final section covers various advanced animation techniques. Appendices list special registers for P/M graphics and PM Animator as well as references to existing material on the subject.

At the heart of PM Animator are two Editors: Grafix Editor and File Editor. With Grafix Editor, you create a file of up to sixteen images, each eight bits wide by sixteen bits high. Each of these images can serve as a "frame" of an animation sequence. While editing, you can specify and view animation sequences, and overlay two differently-colored designs to create multicolor players. Most DOS commands are available, and many others that make this feature of the package alone a joy to use.

Once you've created a file or two of "frames", you can customize their sequencing and size with the File Editor. This "spreadsheet" program gives you a five-by-ten array of empty boxes into which to load your files, thus allowing you to view fifty of your creations simultaneously. You can then move or copy frames from one part of the grid to another, and then save any sequence as a custom file. This editor also allows you to view and edit multicolor player sequences.

Once you have designed your animation sequence, PM Animator provides you with a relatively painless way of incorporating it into your BASIC program. TOTAL.LST is a BASIC program fragment containing machine language sub-

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PM ANIMATOR

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routines that gives you absolute control over your creations. You can move players horizontally and vertically with simple POKEs, and animate them with a USR call. There is also a high-speed memory clearing routine, a fast file loader, and a Supermove routine for smooth multiplayer movement. You can merge TOTAL.LST with your programs by ENTERing it from the PM Animator disk.

A minor criticism: the program concentrates on the design and movement of players to the exclusion of missiles. It fails to take advantage of the fact that four missiles can be combined to make a fifth player. Most of the time, however, four players is more than enough.

The advanced features of the ATARI computers can be, for all their power, frustratingly difficult to comprehend and use for those of us (most of us!) who are relatively new to computing. Armed with tools like this, however, ATARI owners will disprove cynics who call the home computer boom a fad, and produce software that will allow the machine to truly deserve its nickname: Imagination Machine.

KID GRID

Tronix Publishing
701 W. Manchester Blvd.
Inglewood, CA 90301
(213) 671-8440
$29.95, 16K — Cassette and Diskette

Reviewed by Bryan Welch

Kid Grid is the most exciting mutation of Pac-Man I have ever played. With its dazzling graphics and original variations, this game is a real winner.

The game starts out like this: You begin in the top corner of a grid made up of many colored squares with your player, the Kid. But, being the new kid on the block, things aren't that easy. On your way, you must avoid four bullies: Squashface, Thuggy, Muggy, and Moose. If any of them catch you the results are explosive, and this game really lets you know it. Four against one isn't very fair, but you aren't totally defenseless.

At the start of each screen you load up with a number of stuns. Whenever you press the joystick button, the bullies are stopped in their tracks and become harmless. But be forewarned! This only lasts for about two seconds — just enough time to escape. Your supply of these weapons is also limited, and once they're gone, you're really in trouble. Luckily, you get a fresh supply for each screen.

Now, this all sounds fairly simple. (Notice, I didn't say easy, just simple!) But our friends at Tronix didn't leave it at that. They added multiple skill levels, game options, and even a special feature for left-handed players. Since most joysticks are made for right-handed players, those who are left-handed sometimes find them difficult to use. This special feature lets you use the joystick normally, but with the firing button at the top right. Why should you be forced to modify your joysticks when the program can be written to use them either way? I hope more game programmers will take note and incorporate this feature into their programs.

The graphics and sound in Kid Grid are definitely state-of-the-art. The game has a polished look to it, which makes it very appealing. Careful attention has been paid to every detail, and the result is an action-packed game, which will be at the front of your game shelf for a long time to come.

If you enjoy fast-paced maze games, and are looking for something new, then try Kid Grid. You won't be disappointed.



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Why haven't you heard of us before? We're a public company that's been trading over the counter for 16 years. We've been developing interactive learning systems since 1957. We sell hardware and software for interactive film, slide, video and computer learning to the educational field, vo-techs, industries, military, and several state and federal agencies. Our programs are used in all 50 states and even in some foreign countries! In 1975, we started to convert to the Talk & Teach Computer-Assisted Instruction (CAI) System, licensed Atari to use it in 1977, and in 1981 licensed Radio Shack to use our Talk/Tutor System. So, why haven't you heard of us? Frankly, we've kept a low profile. Until now.

Is there something wrong with our software? Well, we don't ask you to enter your name so we can drop it into some later text. We don't ask you to type in your answer and refuse to accept it if it's not spelled just right. And, we don't branch around a lot when you make an error. Our programs simply let you know if you're wrong by proceeding only when you select the right multiple-choice answer.

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DEMON ATTACK

Imagic
981 University Ave.
Los Gatos, CA 95030
(408) 923-8464
$34.95, 16K—cartridge

Reviewed by David Plotkin

When IMAGIC first brought out its **Demon Attack** cartridge for the venerable Atari VCS, it set new highs for graphics. It was also a lot of fun to play, with wave after wave of different aliens assaulting the player's defending the base. Demon Attack is now available for the Atari 400 / 800, and while it certainly doesn't strain the graphics capabilities of the computer (the graphics are almost identical to the VCS version), it maintains the good playability of the original.

Demon Attack is a classic space shoot-out with a left and right mobile groundbase controlled by the player's joystick. You fire upward at bomb-dropping aliens. There are twelve different types of aliens, each new wave is comprised of a different type until, with wave 13, you start over again. Several of the types of aliens look identical and are only distinguished by the speed at which they attack. The aliens attack three at a time, with each alien flapping back and forth on a different level. Only the lowest alien drops clusters of bombs and each alien is replaced as it is destroyed until that wave is over. At the higher levels, the aliens break into two when hit, each one must then be separately destroyed. As is usual, you can only have one missile on the screen at a time.

The graphics on Demon Attack are clever — the flapping high resolution aliens are eyecatching and some of the forms are quite amusing. The sound is well-synchronized with the motions of the wings and other moving parts of the aliens. The screen is free of distractions, as well.

The Demon Attack cartridge, besides offering multiple skill levels, also offers two different game variations. In the first, your missile rises straight up, from the position the base was at when you fired. This makes it difficult to hit the upper levels of aliens, but you can duck under the lowest alien, fire, and get out of the way of its bombs. The second variation provides you with steerable missiles. After the missile is fired, it remains lined up with the missile base and can be guided. Clearly, the "duck and fire" strategy won't work, but it is easier to hit the upper level aliens.

The graphics on Demon Attack are clever — the flapping high resolution aliens are eyecatching and some of the forms are quite amusing.

It is perhaps unfortunate that IMAGIC seems to have translated Demon Attack almost exactly from the Atari VCS version. Thus, although the game maintains good playability — you want to keep playing to do a little better next time — it doesn't really have the depth one normally expects from a computer game. IMAGIC wouldn't have had to go too far afield to find a related scenario — the "Mother Ship" sequence from the Intellivision version of Demon Attack would have been an admirable addition to this game. I suspect that Demon Attack may not have the interest holding power of some of the other software now available. Only time will tell.

IMAGIC's Demon Attack is fun to play, and at $34.95, it is a bargain for a cartridge. If you're not tired of space games, and you want a fast, fun challenge, I recommend Demon Attack.

STARCROSS

Infocom, Inc.
55 Wheeler St.
Cambridge, MA 02138
(617) 492-1031
$39.95, 32K — diskette

Reviewed by Harvey Bernstein

The first in the INTERLOGIC, text-only, adventure-game series from Infocom, **Starcross** is one of the most engrossing and engaging adventures I have experienced in a long time. This game was released just after the popular ZORK trilogy and it has been a favorite of mine for a while now. As a prose adventure, it is one of the great science fiction "interactive novels".

Starcross transports you to the year 2186, launching you headlong into the depths of space. As commander of the M.C.S. Starcross, your mission is to find and harness the energy of a black hole. Your ship is equipped with a computer that has taken over the functions of navigation and routine maintenance. A mass detector aids your search, along with powerful magnets. With such competent mechanical help, you relax and doze off into a deep sleep.

Suddenly, the alarm in the mass detector awakens you, and you head for the control room. Just outside the ship you spot an alien artifact and are presented with several challenging puzzles. How do you get inside it? How do you operate the device? You will also meet various inhabitants of the artifact. Zork players may even meet some old friends.

Starcross takes some surprising turns at this point and I wouldn't want to ruin the "plot" by saying any more.

Unlike most adventures, the text-only format here enhances the experience for me. No graphics could match the descriptions provided by the rich prose of the game. Adventurers new to the Infocom series should be forewarned, however. Room descriptions may refer to items previously undescribed. This proves to be the most frustrating aspect of the game.

About Starcross vocabulary: In no other adventure have I found such a wide range of commands that can be "understood" by the program. This program accepts almost all the words you type, and in plain English. Not everything you try will be effective, but that is the nature of the game.

Starcross is a welcome addition to any adventurer's collection. Next time someone asks you why you like all-text adventures, show them Starcross.

HELP *continued from page 10*

TYPO TABLE

Variable checksum = 106293

Line num range		Code	Length
20	- 200	MF	532
220	- 360	BG	521
380	- 560	TU	513
580	- 740	VZ	557
760	- 880	NG	516
900	- 900	DC	15

```
20  *= $600
30  PLA PULL OFF DUMMY ARG COUNT
40  LDA #$08
50  STA $D01F INIT SWITCHES
60 M1 LDA $D01F GET VALUE
70  AND #$01 ?START PRESSED
80  BNE M1 NOT YES
90  LDY #$FF DELAY
0100 M2 LDX #$FF SOME
0110  JSR DEL GO LOOP
0120  DEY
0130  BNE M2
0140  LDA #$08  RESET
0150  STA $D01F START SWITCH
0160  LDX 208   GET PARM
0170  CPX #0 ?PLAYBACK
0180  BNE NP NO
0190  JMP PB GO PLAY BACK SOUND
0200 NP LDA #0
0210  STA $D400 KILL DMA
0220  STA $D40E KILL VBI
0230 MD STA $D40A WSYNC
0240  STA $D40A WSYNC
0250 DONE LDX 207
0260  JSR DEL GO WAIT IF NEED BE
0270  LDA $D204 GET INPUT BYTE
0280 GO LDX #$13
0290  STX $D20F TURN OFF FAST SCAN
0300  LDX #$17
0310  STX $D40A WSYNC
0320  STX $D20F SAY FAST POT SCAN
0330  STX $D20B START SCAN
0340  LDX FLAG
0350  CPX #0 ?LEFT HALF OF BYTE
0360  BNE RT NO
0370  AND #$F0
0380  STA BYTE SAVE IT
0390  ROR A
0400  ROR A
0410  ROR A
0420  ROR A
0430  AND #$0F
0440  ORA #$10 SAY USE 4 BIT D/A
0450  STA $D201 ECHO TO SPEAKER
0460  INC FLAG SAY RIGHT NEXT
0470  JMP MD
0480 RT ROR A
0490  ROR A
0500  ROR A
0510  ROR A
0520  AND #$0F
0530  ORA #$10 SAY USE 4 BIT D/A
0540  STA $D201 SAY SOMETHING
0550  AND #$0F REMOVE TOP 4 BITS
0560  ORA BYTE ADD IN LEFT NIBBLE
0570  DEC FLAG SAY LEFT NEXT
0580  LDY #0
0590  STA (205),Y SAVE TO BYTE
0600  LDA $D01F
0610  AND #$01 ?START KEY
0620  BEQ FINI YES
0630 D3 INC 205 INCREMENT
0640  BNE MD BUFFER
0650  INC 206 AREA
0660  LDX 206 POINTER
0670  CPX 209 ?END OF MEMORY
0680  BNE MD  NO CONTINUE
0690  JMP FINI GO FINISH THINGS
0700 DEL DEX
0710  BNE DEL
0720  RTS
0730 FINI LDA 208 ?TALK A LOT
0740  CMP #2 ?HUH
0750  BNE FINI1 NO, JUST RETURN
0760  LDA #0 RESET
0770  STA 205 BUFFER
0780  LDA #64 START
0790  STA 206 POINTERS
0800  JMP NP AND DO IT AGAIN
0810 FINI1 LDA #$40
0820  STA $D40E RESTART VBI'S
0830  LDA #$22 AND SCREEN DMA
0840  STA $D400
0850  RTS
0860 PB LDA #0
0870  STA $D40E KILL VBI
0880  STA $D400 KILL DMA
0890 PB1 LDX 207 GET DELAY COUNT
0900  JSR DEL
0910  LDY #0
0920  LDA (203),Y GET SOME DATA
0930  TAX
0940  ROR A
0950  ROR A
0960  ROR A
0970  ROR A
0980  AND #$0F GET LEFT NIBBLE
0990  ORA #$10 SAY USE D/A
```

```
1000  STA $D201 STORE THE VALUE
1010  TXA
1020  AND #$0F
1030  ORA #$10
1040  CLC
1050  CLC
1060  CLC
1070  CLC
1080  LDX 207 GET DELAY VALUE
1090  JSR DEL
1100  STA $D201 MAKE SOME NOISE
1110 D4 INC 203 INCREMENT
1120  BNE PB
1130  INC 204 BUFFER
1140  LDX 204
1150  CPX 206 POINTERA
1160  BNE PB1
1170  JMP FINI
1180 BYTE .BYTE 0
1190 FLAG .BYTE 0
```

CONSERVE RAM

The following listing was inadvertantly omitted from the article Conserve RAM by Jerry White. The article originally appeared on page 50 of the July 1983 issue of ANTIC.

```
1 REM DATA2STR (DATA TO STRING)
   12/23/82  by Jerry White
2 REM THIS PROGRAM CREATES AN ASM
3 REM SUBROUTINE IN LINE NUMBER 100.
4 REM AT THE READY PROMPT
5 REM LIST"C:",100 OR
6 REM LIST"D:FILENAME.LST",100
7 REM
200 GRAPHICS 0:POKE 82,2:POKE 83,39:PO
KE 710,240:POKE 712,240:POKE 709,13
300 DIM BASIC$(120):BASIC$="100 GRAPHICS 0:AS
M=ADR("
400 BASIC$(LEN(BASIC$)+1)=CHR$(34)
500 READ NUMBER:IF NUMBER=999 THEN 700
600 BASIC$(LEN(BASIC$)+1)=CHR$(NUMBER)
:GOTO 500
700 BASIC$(LEN(BASIC$)+1)=CHR$(34)
800 BASIC$(LEN(BASIC$)+1)="):X=USR(ASM
):STOP"
900 ?:?:?BASIC$:POSITION 2,0:POKE 7
64,12:END
1000 REM DATA FOR ASM SUBROUTINE
1001 REM
1010 DATA 104
1011 REM .KEEP BASIC HAPPY   PLA
1012 REM
1020 DATA 169,2
1021 REM .LEFT MARGIN          LDA #2
1022 REM
1030 DATA 133,82
1031 REM .POKE 82,2          STA 82
1032 REM
1040 DATA 169,39
1041 REM .RIGHT MARGIN          LDA #39
1042 REM
1050 DATA 133,83
1051 REM .POKE 83,39          STA 83
1052 REM
1060 DATA 169,144
1061 REM .BACKGROUND COLOR   LDA #144
1062 REM
1070 DATA 141,198,2
1071 REM .POKE 710,144        STA 710
1072 REM
1080 DATA 169,55
1081 REM .BORDER COLOR          LDA #55
1082 REM
1090 DATA 141,200,2
1091 REM .POKE 712,55         STA 712
1092 REM
1100 DATA 169,13
1101 REM .FOREGROUND COLOR   LDA #13
1102 REM
1110 DATA 141,197,2
1111 REM .POKE 709,13         STA 709
1112 REM
1120 DATA 96
1121 REM .RETURN TO BASIC    RTS
1122 REM
1130 DATA 999
```

TYPO TABLE

Variable checksum = 98094

Line num range	Code	Length
1 - 600	RB	463
700 - 1030	YR	265
1031 - 1070	PD	207
1071 - 1110	PV	210
1111 - 1130	EF	91

ESCHER SKETCHER *continued from page 55*

```
60 ? "INPUT LEFT COLOR AND LUM.":TRAP
70:CLLR(1,3)=2:INPUT I,J:CLLR(1,3)=I*1
6+J
70 ? :? "BOX #2"
80 ? "INPUT TOP COLOR AND LUM.":TRAP 9
0:CLLR(2,1)=236:INPUT I,J:CLLR(2,1)=I*
16+J
90 ? "INPUT RIGHT COLOR AND LUM.":TRAP
 95:CLLR(2,2)=134:INPUT I,J:CLLR(2,2)=
I*16+J
95 ? "INPUT LEFT COLOR AND LUM.":TRAP
100:CLLR(2,3)=66:INPUT I,J:CLLR(2,3)=I
*16+J
100 REM *** START POSITION ***
110 ? "↖START=TOGGLES BETWEEN POSITION
ING":? "CURSOR AND DRAWING BOXES"
120 ? "SELECT=TOGGLES BETWEEN BOX #1 A
ND":? "BOX #2"
130 ? "OPTION=CLEARS SCREEN"
140 ? :? "PRESS START TO BEGIN"
142 IF PEEK(53279)=7 THEN 142
160 X=40:Y=96:GRAPHICS 10:CBX=0
170 POKE 705,CLLR(1,1):POKE 706,CLLR(1
,2):POKE 707,CLLR(1,3)
172 POKE 708,CLLR(2,1):POKE 709,CLLR(2
,2):POKE 710,CLLR(2,3)
174 POKE 704,BAK:POKE 711,CSSR
200 REM *** POSITION CURSOR ***
205 IF PEEK(53279)<>7 THEN 205
207 D(4)=0:D(3)=0:D(2)=0:D(1)=5:L=0
210 LOCATE X,Y,I
220 COLOR 0:PLOT X,Y:GOSUB 240
225 IF PEEK(53279)=5 THEN GOSUB 280
227 IF PEEK(53279)=3 THEN 160
230 COLOR 7:PLOT X,Y:GOSUB 250:GOTO 22
0
240 IF PEEK(53279)=6 THEN POP :COLOR I
:PLOT X,Y:POKE 764,255:GOTO 1000
245 RETURN
250 ST=STICK(0):IF ST=15 OR ST=10 OR S
T=9 OR ST=5 OR ST=6 THEN RETURN
260 J=STRIG(0):IF L=0 THEN COLOR I:PLO
T X,Y
262 IF (ST=13 AND J=1) OR ST=7 THEN X=
X+1
263 IF (ST=14 AND J=1) OR ST=11 THEN X
=X-1
264 IF ST=14 OR ST=7 THEN Y=Y-1
265 IF ST=13 OR ST=11 THEN Y=Y+1
267 X=X+(X=-1)-(X=80):Y=Y+(Y=-1)-(Y=19
2):POKE 77,0
270 LOCATE X,Y,I:RETURN
280 L=1-L
285 IF PEEK(53279)<>7 THEN 285
290 RETURN
300 REM *** MAIN LOOP ***
310 ST=STICK(0):IF ST=14 OR ST=7 OR ST
=13 OR ST=11 THEN 900
320 IF PEEK(53279)=3 THEN 160
330 IF PEEK(53279)=5 THEN 400
335 IF PEEK(53279)=6 THEN 200
340 GOTO 300
400 REM *** CHANGE BOX COLORS ***
410 CBX=1-CBX
420 IF PEEK(53279)<>7 THEN 420
430 GOTO 300
900 REM *** DRAW BOX ***
910 D(4)=D(3):D(3)=D(2):D(2)=D(1)
920 D(1)=1*(ST=14)+2*(ST=7)+3*(ST=13)+
4*(ST=11)
922 IF ST=14 AND STRIG(0)=0 THEN D(1)=
5
925 IF ST=13 AND STRIG(0)=0 THEN D(1)=
6
930 X=X+3*(D(1)=3 OR D(1)=2)-3*(D(1)=1
 OR D(1)=4):Y=Y+3*(D(1)=3 OR D(1)=4)-3
*(D(1)<3)+10*(D(1)=6)-10*(D(1)=5)
940 IF X<3 THEN X=3
945 IF X>75 THEN X=75
950 IF Y<4 THEN Y=4
955 IF Y>180 THEN Y=180
960 POKE 77,0
1000 REM *** BOX TOP ***
1010 COLOR 1+CBX*3
1020 IF D(1)=6 THEN 2000
1040 IF D(1)=1 AND D(2)=6 THEN GOSUB 1
100:GOTO 2000
1050 IF D(1)=2 AND D(2)=6 THEN GOSUB 1
500:GOTO 2000
1060 GOSUB 1100:GOSUB 1500:GOTO 2000
1100 REM *** LEFT HALF ***
1110 TRAP 1120:PLOT X,Y:DRAWTO X,Y-4
1120 TRAP 1125:PLOT X-1,Y-1:DRAWTO X-1
,Y-3
1125 TRAP 1130:PLOT X-2,Y-2
1130 RETURN
1500 REM *** RIGHT HALF ***
1520 TRAP 1535:PLOT X+1,Y:DRAWTO X+1,Y
-4
1535 TRAP 1540:PLOT X+2,Y-1:DRAWTO X+2
,Y-3
1540 TRAP 1550:PLOT X+3,Y-2
1550 RETURN
2000 REM *** DRAW LEFT SIDE ***
2010 COLOR 2+CBX*3
2020 IF D(1)=2 THEN 3000
2025 IF D(1)=6 AND D(2)=2 THEN GOSUB 2
500:GOSUB 2700:GOTO 3000
2030 IF D(1)>2 THEN GOSUB 2300:GOSUB 2
500:GOSUB 2700:GOTO 3000
2040 IF D(2)=2 THEN GOSUB 2300:GOTO 30
00
2050 IF D(2)=1 AND D(3)=2 AND D(4)=2 T
HEN GOSUB 2300:GOSUB 2500:GOTO 3000
2060 GOSUB 2300:GOSUB 2500:GOSUB 2700:
GOTO 3000
2300 REM *** TOP WEDGE ***
2305 TRAP 2310:PLOT X,Y+1
2310 TRAP 2320:PLOT X-1,Y+1:PLOT X-1,Y
+2
2320 TRAP 2330:PLOT X-1,Y
2330 TRAP 2340:PLOT X-2,Y+1:DRAWTO X-2
,Y-1
2340 TRAP 2350:PLOT X-2,Y+2:DRAWTO X-2
,Y+3
2350 RETURN
2500 REM *** MID WEDGE ***
```

```
2510 TRAP 2520:PLOT X,Y+2:DRAWTO X,Y+7
2520 TRAP 2530:PLOT X-1,Y+3:DRAWTO X-1
,Y+8
2530 TRAP 2540:PLOT X-2,Y+4:DRAWTO X-2
,Y+8
2540 RETURN
2700 REM *** BOTTOM WEDGE ***
2710 TRAP 2720:PLOT X,Y+8:DRAWTO X,Y+1
0
2720 TRAP 2730:PLOT X-1,Y+9
2730 RETURN
3000 REM *** DRAW RIGHT SIDE ***
3010 COLOR 3+CBX*3
3020 IF D(1)=1 THEN 4000
3025 IF D(1)=6 AND D(2)=1 THEN GOSUB 3
500:GOSUB 3700:GOTO 4000
3030 IF D(1)>2 THEN GOSUB 3300:GOSUB 3
500:GOSUB 3700:GOTO 4000
3040 IF D(2)=1 THEN GOSUB 3300:GOTO 40
00
3050 IF D(2)=2 AND D(3)=1 AND D(4)=1 T
HEN GOSUB 3300:GOSUB 3500:GOTO 4000
3060 GOSUB 3300:GOSUB 3500:GOSUB 3700:
GOTO 4000
3300 REM *** TOP WEDGE ***
3305 TRAP 3310:PLOT X+1,Y+1
3310 TRAP 3320:PLOT X+2,Y+1:PLOT X+2,Y
+2
3320 TRAP 3330:PLOT X+2,Y
3330 TRAP 3340:PLOT X+3,Y+1:DRAWTO X+3
,Y-1
3340 TRAP 3350:PLOT X+3,Y+2:DRAWTO X+3
,Y+3
3350 RETURN
3500 REM *** MID WEDGE ***
3510 TRAP 3520:PLOT X+1,Y+2:DRAWTO X+1
,Y+7
3520 TRAP 3530:PLOT X+2,Y+3:DRAWTO X+2
,Y+8
3530 TRAP 3540:PLOT X+3,Y+4:DRAWTO X+3
,Y+8
3540 RETURN
3700 REM *** BOTTOM WEDGE ***
3710 TRAP 3720:PLOT X+1,Y+8:DRAWTO X+1
,Y+10
3720 TRAP 3730:PLOT X+2,Y+9
3730 RETURN
4000 GOTO 300
```

TYPO TABLE

Variable checksum = 173371

Line num range	Code	Length
10 - 50	FQ	565
60 - 110	JB	560
120 - 207	ZZ	559
210 - 264	ML	470
265 - 340	RA	391
400 - 930	VE	642
940 -1100	SV	387
1110 -2020	HJ	385
2025 -2330	GY	507
2340 -3000	JI	384
3010 -3320	MG	513
3330 -3730	SJ	444
4000 -4000	MD	13

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PICTURE UTILITY *continued from page 54*

```
1700 IF PEEK(I)=79 THEN POKE I,78:POKE
 I+C2,PEEK(I+C2)-16:I=I+C2
1710 NEXT I:DUMMY=USR(ADR(MOVEN$),DL,1
550,200):POKE 1750,14:POKE 1751,C6
1720 DUMMY=USR(ADR(HBORD$),Z,DL,202):P
OKE 106,SCREEN-33
1729 REM : If blank, get colors
1730 IF BLANK=C THEN BLANK=Z:J=C:K=C4:
GRAPHICS Z:POKE 709,12:? :GOSUB 700:GO
TO PIC
1739 REM : Get input file,read colors
1740 BLANK=Z:BUF=SM+OFFSET:COLREG=BUF+
7680:FILE$=INFILE$:IO=C4:GOSUB 410
1750 FOR I=C TO C4:CX(I)=PEEK(COLREG+I
-C):NEXT I
1760 FOR I=Z TO C3:POKE COLREG+I,Z:NEX
T I
1770 GOSUB 630:GOTO PIC
```

TYPO TABLE

Variable checksum = 3965592

Line num range	Code	Length
19 - 130	MO	535
140 - 239	TD	369
240 - 330	NU	550
340 - 450	TD	385
460 - 530	KL	523
540 - 630	VL	336
640 - 740	BQ	493
750 - 850	VV	474
860 - 960	XG	528
970 -1040	FQ	506
1050 -1130	VM	529
1140 -1200	LP	562
1210 -1310	UA	491
1320 -1419	RN	415
1420 -1490	WO	590
1500 -1560	BB	574
1570 -1620	WY	536
1630 -1700	XR	522
1710 -1770	AS	366

LISTING CONVENTIONS

Table Information

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (人) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. On the 1200XL there is no logo key; inverse video is controlled by a key on the function row. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

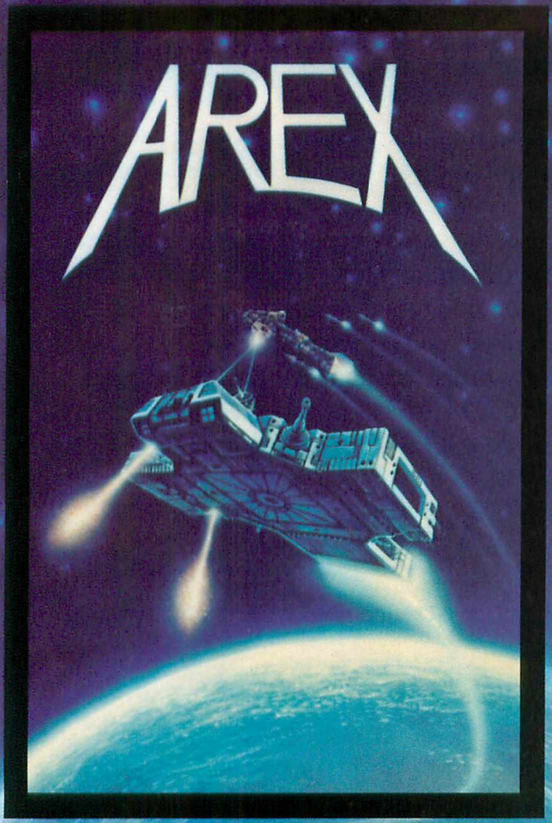
NORMAL VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0
	CTRL A	1
	CTRL B	2
	CTRL C	3
	CTRL D	4
	CTRL E	5
	CTRL F	6
	CTRL G	7
	CTRL H	8
	CTRL I	9
	CTRL J	10
	CTRL K	11
	CTRL L	12
	CTRL M	13
	CTRL N	14
	CTRL O	15
	CTRL P	16
	CTRL Q	17
	CTRL R	18
	CTRL S	19
	CTRL T	20
	CTRL U	21
	CTRL V	22
	CTRL W	23
	CTRL X	24
	CTRL Y	25
	CTRL Z	26
	ESC ESC	27
	ESC CTRL −	28
	ESC CTRL =	29
	ESC CTRL +	30
	ESC CTRL *	31
	CTRL .	96
	CTRL ;	123
|	SHIFT =	124
	ESC SHIFT CLEAR	125
	ESC DELETE	126
	ESC TAB	127

INVERSE VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	人CTRL ,	128
	人CTRL A	129
	人CTRL B	130
	人CTRL C	131
	人CTRL D	132
	人CTRL E	133
	人CTRL F	134
	人CTRL G	135
	人CTRL H	136
	人CTRL I	137
	人CTRL J	138
	人CTRL K	139
	人CTRL L	140
	人CTRL M	141
	人CTRL N	142
	人CTRL O	143
	人CTRL P	144
	人CTRL Q	145
	人CTRL R	146
	人CTRL S	147
	人CTRL T	148
	人CTRL U	149
	人CTRL V	150
	人CTRL W	151
	人CTRL X	152
	人CTRL Y	153
	人CTRL Z	154
	ESC SHIFT DELETE	156
	ESC SHIFT INSERT	157
	ESC CTRL TAB	158
	ESC SHIFT TAB	159
	人CTRL .	224
	人CTRL ;	251
	人SHIFT =	252
	ESC CTRL 2	253
	ESC CTRL DELETE	254
	ESC CTRL INSERT	255

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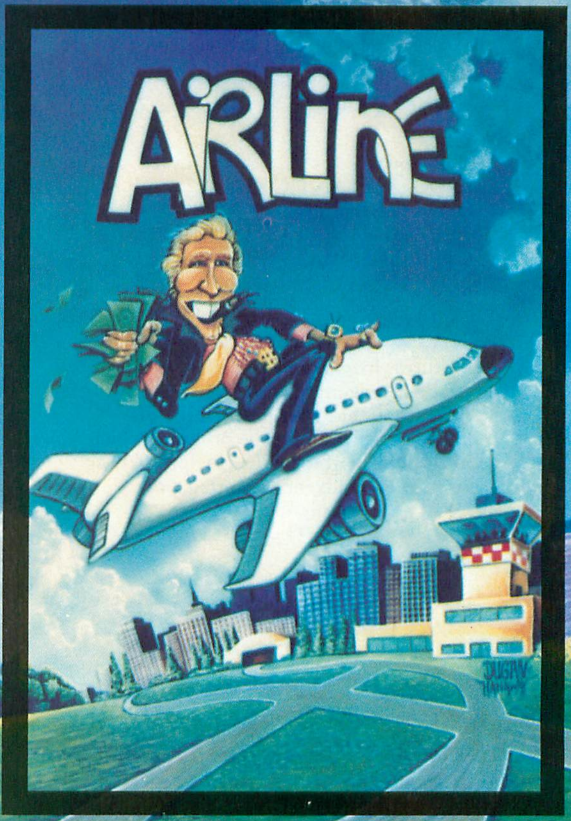
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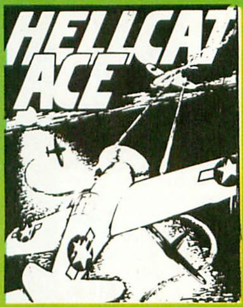
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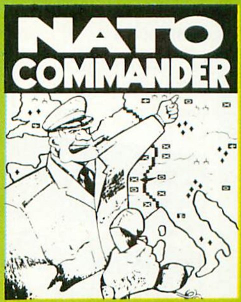
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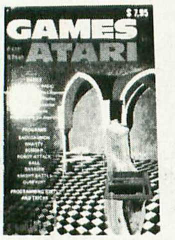
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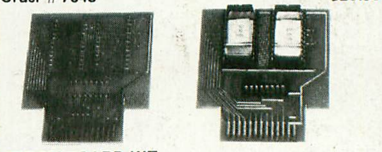
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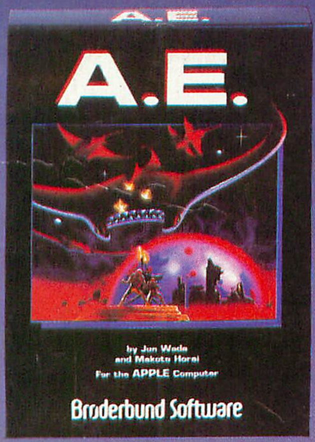
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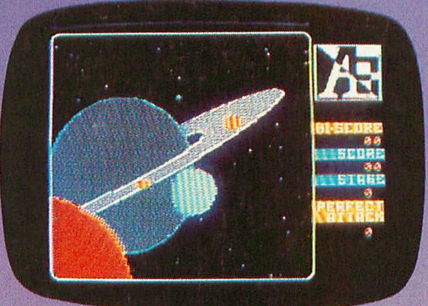
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